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Instructions for use

Japanese Talitridae¹⁾

By

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(With Plates IX-XXII and 27 Textfigures)

Very little has hitherto been known concerning the amphipods of the family Talitridae (Orchestidae) from Japan, except the following four forms, *Talorchestia japonica* Tattersall, *Orchestia kokuboi* Uéno, *Orchestia ditmari* Dershavin, and *Ceinina japonica* Stephensen. Although nine other species belonging to four genera were reported by several authors from Japan, the validity of those species is quite problematical, as their descriptions and figures are far from being complete ones. As a part of my collections of the amphipods of Japan, rather a large number of specimens of orchestids were obtained by myself or were sent to me by several zoologists in Japan. They are referable to thirteen species and two subspecies belonging to five genera, and three species and one subspecies are believed to be new to science. The list of species treated in the present paper is given below.

(Those with an asterisk are new to Japanese fauna.)

- | | |
|---|--------|
| *1. <i>Orchestia platensis</i> KRØYER. | p. 257 |
| 2. <i>Orchestia platensis japonica</i> (TATTERSALL). | p. 261 |
| 3. <i>Orchestia ditmari</i> DERSHAVIN. | p. 263 |
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| *5. <i>Orchestia tenuimana</i> , n. sp. | p. 268 |
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1) Contributions from the Akkeshi Marine Biological Station, No. 23.

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- 13. *Allorchestes malleolus* STEBBING. p. 285
- *14. *Allorchestes malleolus carinatus*, n. subsp. p. 288
- *15. *Allorchestes plumicornis* (HELLER). p. 289

The larger part of the specimens came from Hokkaido, but others were collected in the Kuril Islands, Southern Sakhalin, Japan Proper, Kyūsyū, Korea, and Formosa. I wish to acknowledge my indebtedness to the following gentlemen who kindly placed the material at my disposal; Prof. T. Uchida, the late Mr. S. Takahashi, Messrs. F. Fujita, Y. Hada, H. Hori, M. Kuwabara, K. Muraoka, K. Nakazawa, and S. Okuda. I am much obliged, moreover, to Professors K. Oguma and T. Uchida for their kindness shown me for the publication of the present paper, and to Drs. T. Esaki, M. Uéno, and D. Miyadi who gave me great facilities regarding the materials and literature.

The expense for the present study was partly defrayed by a grant from the Foundation for the Promotion of Scientific and Industrial Researches in Japan, for which the author's deep gratitude is due.

Description of Species

The following descriptions are mainly based on male specimens unless otherwise stated. Discussions on the generic distinction between closely related genera such as *Orchestia* and *Talorchestia*, the geographical distribution in the world of the species in question, and the synonymy of orchestids already reported from Japan and its adjacent territory are reserved until some future time.

In the keys to species of respective genera characters of gnathopods of either sex are avoided as far as possible, because it is not rarely the case that specimens of one or the other sex only are in hand and the keys are of no use unless individuals of other sex are obtained.

Talitridae

Head without pronounced rostrum, mouth-parts strongly projecting below. Fifth side-plate bilobed. First antenna much shorter than 2nd, without accessory flagellum. Basal joint of 2nd antenna coalesced with the head.

Upper lip distally rounded. Lower lip without inner lobes. Mandible without palp. First maxilla, inner plate slender, tipped with 2 plumose setae, outer with 9 apical spines, palp small, at most extending to the base of apical spines of that plate, 1-jointed or minutely 2-jointed. Both plates of 2nd maxilla large, bordered with rows of apical spines, which on inner plates are bounded by a plumose seta on inner margin. First and 2nd gnathopods variable according to genera and sexes. Third uropod usually uniramous, in some rudimentarily biramous. Telson short.

Key to genera of Japanese Talitridae

- 1 { First antenna shorter than peduncle of 2nd antenna 2
- 1 { First antenna longer than peduncle of 2nd antenna 3
- 2 { First gnathopod in female subchelate *Orchestia*, p. 257
- 2 { First gnathopod in female simple *Talorchestia*, p. 273
- 3 { Second gnathopod in male, 5th joint masked behind by 4th *Hyale*, p. 276
- 3 { Second gnathopod in male, 5th joint produced between 4th and 6th 4
- 4 { Third uropod with minute inner ramus *Parhyale*, p. 284
- 4 { Third uropod uniramous *Allorchestes*, p. 285

Genus *Orchestia* LEACH

First antenna shorter than peduncle of 2nd antenna. Palp of maxilliped generally 3-jointed, but sometimes with rudiment of 4th joint. First gnathopods of male subchelate, 2nd also subchelate, but much powerfully constructed. First gnathopod of female subchelate, 2nd feebly chelate. Third uropod uniramous. Telson generally with a slight emargination at apex.

Key to species

- 1 { Outer ramus of 3rd uropod with apical spines only 2
- 1 { Outer ramus of 3rd uropod with both apical and marginal spines 3
- 2 { Palm of 2nd gnathopod in male with 2 tubercles *platensis*, p. 257
- 2 { Palm of 2nd gnathopod in male without tubercles .. *platensis japonica*, p. 261
- 3 { Pleopods degraded, with only 1 joint *tenuimana*, n. sp., p. 268
- 3 { Pleopods not degraded, with more than 1 joint 4
- 4 { Palp of maxilliped rudimentarily 4-jointed *ditmari*, p. 263
- 4 { Palp of maxilliped 3-jointed 5
- 5 { First gnathopod in male, 4th joint with a pellucid lobe behind
..... *solifuga*, n. sp., p. 271
- 5 { First gnathopod in male, 4th joint without a pellucid lobe .. *kokuboi*, p. 266

1. *Orchestia platensis* KRØYER

(Pl. IX & Textfigs. 1-3)

Orchestia platensis, STEBBING, 1906, pp. 540-541; PEARSE, 1912, p. 372;
CHEVREUX, 1908, pp. 494-495, fig. 14; 1925, pp. 276-277, fig. 287;
CHILTON, 1921, pp. 538-541.

Body not strongly compressed, length of body (from the tip of rostrum to the end of telson) about 10 mm. Side-plates with spinuliferous lower margins. First side-plate very small, twice as deep as broad, front margin almost straight, 2nd to 4th side-plates larger than 1st, and almost of the same size, nearly quadrate in shape, each with a small backward projection near the tip of hind margin; 5th the largest, bilobed, front lobe about as deep as 4th, deeper and larger than hind lobe. Post-lateral corner of 3rd pleon segment quadrate with a minutely produced point, margin above roughly serrate and with a few spinules.

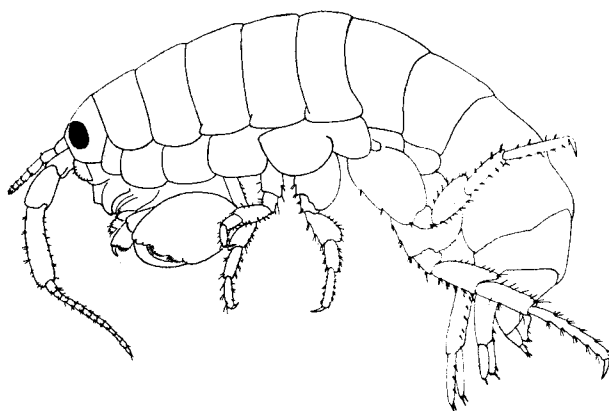


Fig. 1. *Orchestia platensis* KRØYER from Kanbara.
Male. $\times 10$.

Eyes black, rather large, elliptic, as far apart as the shorter diameter.

First antenna reaching end of penultimate joint of 2nd antenna or extending a little beyond it, joints of peduncle subequal in length, but successively narrower distally, flagellum considerably shorter than peduncle, 5-6-jointed. Second antenna about $1/3$ as long as body, penultimate joint of peduncle tumid, $2/3$ as long as ultimate, flagellum shorter than peduncle, with 13-14 strongly depressed joints.

Upper lip with the distal margin evenly rounded. Mandible 6-dentate, lacinia mobilis with 5-6 teeth, spines in the spine-row 4 on the right and 6 on the left mandible. Inner plate of 1st maxilla narrow, surmounted by 2 plumose setae, outer plate with 9 apical pectinate spines, palp small. Both plates of 2nd maxilla with apical rows of slender spines, and on the inner plate with a large plumose seta near inner end of spine rows. Palp of maxilliped 3-jointed, but sometimes with a small tubercle at the apex representing the rudimentary 4th joint (Fig. 2, *a*).

First gnathopod in male subchelate, 5th joint nearly twice as long as 6th, each joint with a pellucid scabrous process near apex of hind margin, which is narrowly rounded on the 5th and broadly rounded on the 6th joint, finger rather long, extending to or a little beyond the apex of the pellucid process.

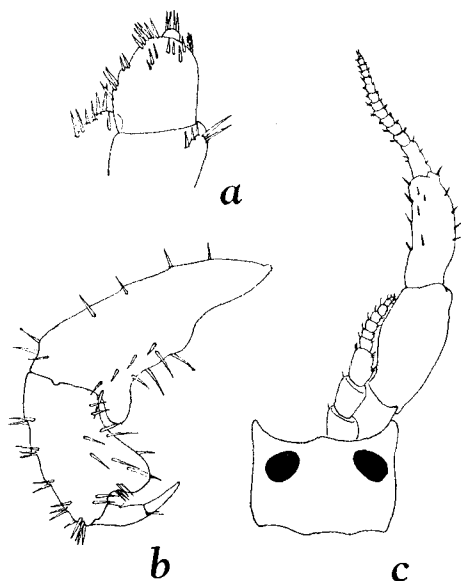


Fig. 2. *Orchestia platensis* KRØYER. Male. *a*, inner view of distal joints of maxilliped palp, showing the minute fourth joint, $\times 75$. *b*, distal joints of first gnathopod, the pellucid lobes are somewhat different in shape from those shown in Pl. IX, $\times 37$. *c*, head and antennae in dorsal view; the peduncle of second antenna is strongly incrassated, $\times 11$.

Second gnathopod in male strongly subchelate, considerably larger than the 1st pair, 2nd joint not widened distally, 3rd joint lobed in front, 6th joint massive, oblong oval, palm oblique, with 2 rounded spinulose elevations, the larger of which situated near finger hinge and the smaller near the defining angle, finger long, strongly curved, point of finger received by a channel on inner surface of defining angle.

First gnathopod in female feebly subchelate, 5th and 6th joints without pellucid processes, 5th a little subapically widened, 6th shorter than 5th, somewhat narrowed distally and with a feebly developed palm, finger longer than palm, slightly notched near middle of hind margin.

Second gnathopod in female feebly chelate, somewhat larger than the 1st pair, 2nd joint lamellar, front margin strongly convex, wider near base than distally, 4th joint with truncate pellucid process at the distal hind corner, 5th with its free hind margin evenly convex, and also pellucid, 6th somewhat shorter than 5th, hind margin produced much beyond the very oblique palm, which is as long as short finger.

Second to 5th pereopods successively larger, spinose, 2nd pereopod shorter than the 1st pair, finger with a distinct notch in the middle of hind margin. Fourth and 5th pereopods markedly larger than the preceding pairs, the 2nd

joints of 3rd to 5th pereopods broadly expanded, with slightly serrulate, spinulose and convex hind margins.

Marsupial plate slender and with a few long setae. Gills narrow, sinuously curved, forming, in general, the letter V.

Pleopods slender, rami shorter than peduncle, with 13-15 joints.

Uropods markedly decrease in size from 1st to 3rd, rami of 1st uropod slightly shorter than peduncle, with apical spines on both rami, but the marginal spines only on inner ramus. Rami of 2nd uropod subequal to peduncle, with both apical and marginal spines, except the inner margin of outer ramus. Ramus of 3rd uropod small, shorter and narrower than the dilated peduncle, with few setules at apex. Telson thick, as broad as long, with spines at the emarginate end and on the outer margins.

Remarks. The species is widely distributed in the world, from the Mediterranean to Africa, India, Hawaiian Islands, and North America, generally living on the beach, but sometimes in rather dry places and in brackish water or even in fresh-water, and is very variable in shape according to the habitat and to the stages of growth. The 2nd gnathopods of male is usually provided with two distinct tubercles on the palm as mentioned above, but they are absent in

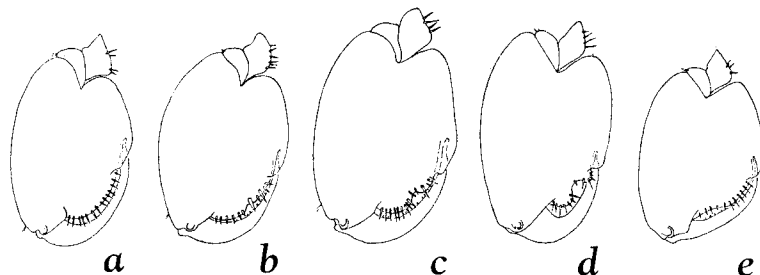


Fig. 3. *a-c*, three successive stages in development of male second gnathopod of *Orchestia platensis* KRØYER from Kanbara, with 8 mm, 10 mm, and 11.5 mm body-length respectively. *a*, $\times 20$; *b*, $\times 20$; *c*, $\times 17$. *d*, male second gnathopod of the same species from Saruru, body-length 13 mm, $\times 14$. *e*, male second gnathopod of *Orchestia platensis japonica* (TATTERSALL) from Akkesi, $\times 14$.

the younger forms, in which the palm is evenly convex and smooth, the transitional stages between these two forms are easily found in a group of specimens (Fig. 3, *a-c*). In some cases, moreover, these tubercles are very prominent as shown in Fig. 3, *d*, and this condition is generally accompanied by the strongly incrassated peduncle of 2nd antenna (Fig. 2, *c*). The pellucid processes on the 1st gnathopod of male are also rather variable in shape (Fig. 2, *b*).

When in life the amphipod is colored pink with irregularly distributed bands of brownish purple, or sometimes slate-colored with light pinkish appendages.

The specimens of this species came from the following localities: Akkesi (under stones or among algae, living together with *Orchestia ditmari*), Muroran (among damp seaweed washed ashore), Saruru (in a habitat similar to the former), Birō (under fallen leaves on dry sand, more than 30 meters distant from the high-water mark, together with *Porcellio laevis*), all in Hokkaido; Kanbara and Misaki in Central Japan (among seaweed near high-water mark), Tansui in Formosa (at the estuary of the River Tansui).

2. *Orchestia platensis japonica* (TATTERSALL)

(Pl. X & Textfigs. 4-6)

Talorchestia japonica, TATTERSALL, 1922, pp. 452-453, pl. 21, figs. 1-10.

This form was described as a new species by Tattersall in 1922, basing on specimens collected among damp weeds on the shore of Lake Biwa at Zeze. According to his descriptions and figures, how-

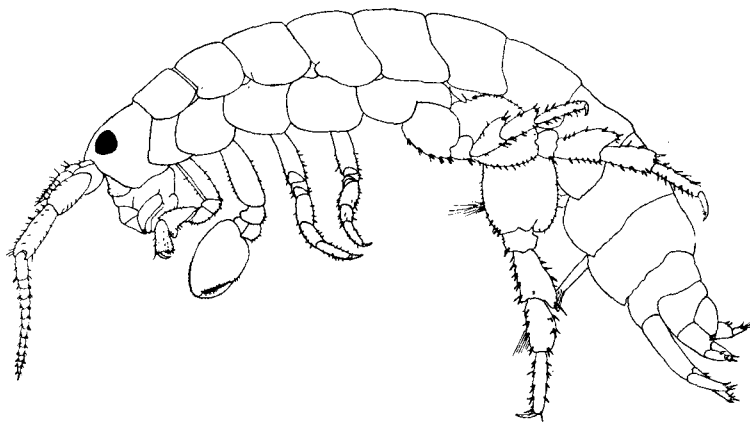


Fig. 4. *Orchestia platensis japonica* (TATTERSALL) from Osyoro.
Male. $\times 10$.

ever, the form has "just a suggestion of a palm" on the 6th joint of 1st gnathopod in female, and should, therefore, be referred to the genus *Orchestia* instead of *Talorchestia*, the 1st gnathopod of female being subchelate in the former genus, and simple in the latter.

Though his description went into detail he showed nothing about the discriminating characters of the new species from the other known forms. *Talorchestia japonica*, or better be called *Orchestia japonica*, differs nothing from the cosmopolitan form, *O. platensis* described above, except the character of 2nd gnathopod of male, which in *platensis* the palm is provided with 2 tubercles, while they are wanting in *japonica*. (Compare Fig. 3, *a-d* with *e*).

Among the collections of Japanese orchestids before me the amphipods referable to *O. japonica* are found from the following localities: Wakkanai, Esasi, Akkesi, Muroran, Haboro, Rumoe, Masike, Osyoro, all in Hokkaido and among damp seaweed washed ashore, and under damp fallen leaves in the Botanical Garden of the Hokkaido Imperial University in Sapporo; under dead leaves in a vacant lot in Tokyo, and in a stream in the suburb of Tokyo; on the beach of Osima and Mesima in Danzō Is., west of Kyūsyū.

The palm of 2nd gnathopod of male in *O. japonica* is slightly convex near finger hinge, but in younger forms of *O. platensis* the palm is evenly convex and without such concavity, by which these two closely allied forms are easily distinguished. The 4th and 5th joints in the 3rd to 5th pereopods are, not rarely, strongly dilated and thickened as shown in Pl. X and in Textfig. 5, *a-c*, and especially

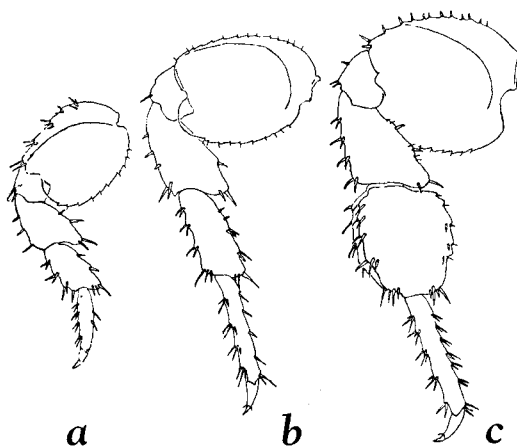


Fig. 5. *Orchestia platensis japonica* (TATTERSALL) from Akkesi. Male. *a-c*, 3rd to 5th pereopods from one and the same individual. The 4th and 5th joints in the 5th pereopod are strongly incrassated. Compare Fig. 6. $\times 7$.

marked in the 5th pair (Fig. 5, c). No incrassated pereiopods have been found among the specimens of *O. platensis* before me.

The male and female to be referred to the Tattersall's species are illustrated in Pl. X of the present paper, and, as the figures show,

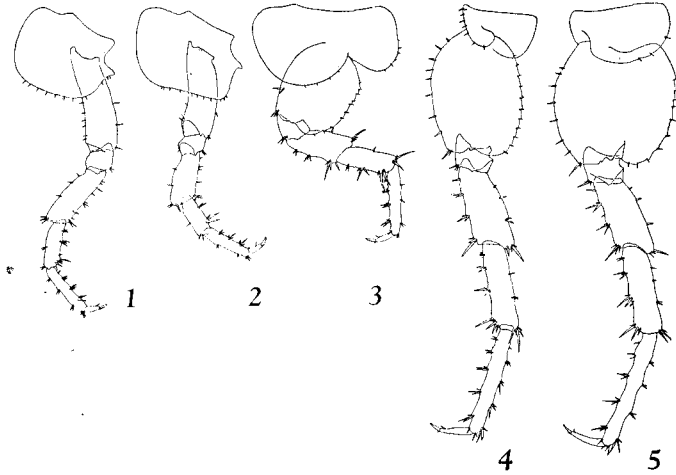


Fig. 6. First to fifth pereiopods of a male *Orchestia platensis japonica* (TATTERSALL) from a stream in the suburb of Tokyo. These appendages are not strongly incrassated as those shown in Pl. X and in Textfig. 5. $\times 14$.

as there are found no important differences between this and the preceding forms except the character of male 2nd gnathopod, the present author treats the form in question as a subspecies of *O. platensis*.

3. *Orchestia ditmari* DERSHAVIN

(Pl. XI & Textfigs. 7-8)

Orchestia ditmari, DERSHAVIN, 1923, p. 187, pl. 6; UÉNO, 1935, pp. 90, 93.

Body robust, rather large and elongate, attaining 32 mm or more, and the anterior half of each of the pleon segments is slightly concave dorsally. First side-plate not concealed by the 2nd, and nearly half as large as the latter. Second to 4th side-plates similar in shape, becoming successively larger posteriorly, and each with a prominent backward process on hind margin. Front lobe of 5th side-plate nearly as deep as 4th, but slightly deeper and broader than hind lobe. Third pleon segment, post-lateral corners nearly quadrate, hind margin slightly sinuate and serrulate (Fig. 8).

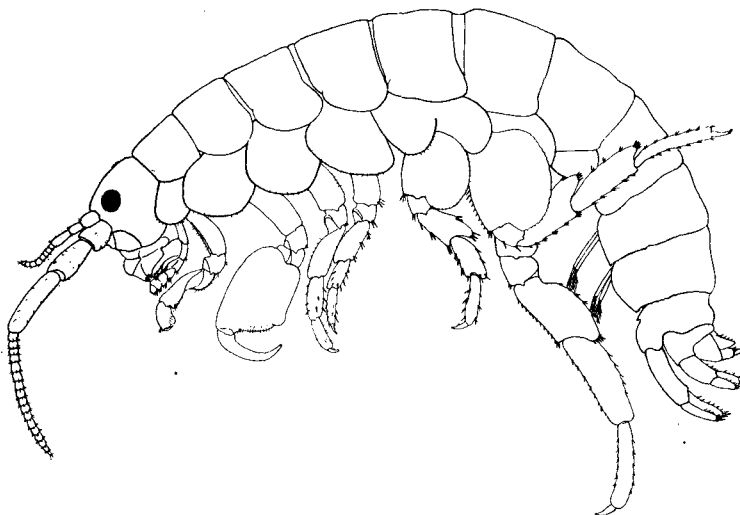


Fig. 7. *Orchestia ditmari* DERSHAVIN from Akkesi. Male. $\times 5$.

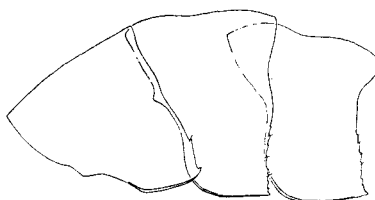


Fig. 8. Side view of first to third pleon segments in *Orchestia ditmari* DERSHAVIN from Akkesi. Male. $\times 9$.

Eyes black, subrotund, separated by a distance equal to their diameter, or, in some cases, are somewhat wider apart from each other.

First antenna extending slightly beyond the distal end of penultimate joint of 2nd antenna, but never beyond the proximal $1/3$ of the ultimate joint; joints of peduncle subequal, and their combined length is somewhat longer than flagellum, which is 6-8-jointed in male and 5-6-jointed in female. Second antenna $1/4$ to $1/3$ the body in length, with stout peduncle, the ultimate joint of which subequal in length to the 2 preceding joints combined; flagellum subequal or shorter than peduncle, with 15-19 joints in male and 14-16 joints in female, and each of the joints are short and depressed.

Maxilliped with a small but distinct rounded tubercle at the summit of palp, which probably represents the rudimentary 4th joint.

First gnathopod in male subchelate, 5th joint with a narrowly rounded subapical pellucid prominence behind, 6th shorter than 5th, distal hind corner

considerably produced behind and below beyond slightly oblique palm, finger reaching to the middle of boss. These two bosses are accompanied by long setules.

Second gnathopod in male strongly subchelate, 6th joint very massive, trapezoid in form, hind margin almost straight, half as long as slightly convex front margin, palm oblique, anterior half almost straight, posterior half convex, with a low tubercle at the defining angle to conceal the curved tip of finger inside it.

First gnathopod in female feebly subchelate, 6th joint parallel-sided, defining angle slightly produced into a scabrous boss, palm transverse, finger much longer than palm.

Second gnathopod in female feebly chelate, 2nd joint expanded as a convex lamella in front, distal hind corner of 4th joint with a low rounded elevation, both margins of 5th joint convex, stronger on the hind margin and scabrous, front margin of 6th joint almost straight while its hind margin is evenly convex extending beyond palm, which is strongly oblique, overlapped by the short finger.

Second pereopod with the finger notched behind. Fourth and 5th pereopods considerably larger in size than the preceding pairs, and in 3rd, 4th, and 5th pereopods the 2nd joints are strongly convex behind and below, extending considerably beyond the distal end of these joints, and almost reach to or a little beyond the lower end of the 3rd joint.

Pleopods ill-developed, rami much shorter than peduncle, with only 4 or 5 joints and poorly armed with setae. Uropods thick, armed with strong spines. Rami of 1st uropod shorter than peduncle, those of 2nd and 3rd uropods subequal to peduncle, and all the rami are provided with both apical and marginal spines. Telson as broad as long, rounded triangular in shape, slightly emarginate at apex, and with many spines on the distal margin.

Remarks. This species is easily distinguished from *O. platensis* in the following characteristics; 1) the body is much larger and robust, 2) the palm of the 1st gnathopod in male is almost smooth in *ditmari*, while it is provided with 2 tubercles in *platensis*, 3) the 1st gnathopod of male is provided with a small but distinct pellucid lobe at the defining angle of hand, but the lobe is wanting in *platensis*, 4) joints of rami of pleopods in *ditmari* are fewer (4-5) in number compared with those in *platensis* (13-15), 5) and the outer ramus of the 1st uropod is provided with both apical and marginal spines while in *platensis* the rami is armed with apical spines only.

The species was first described by Dershavin in 1923 from Kamtschatka, and was later reported by Uéno (1935) from the brackish water lake Tonnai-ko in Southern Sakhalin on the coast of Okhotsk Sea. The specimens examined by me came from Tonnai-ko, mentioned above, Syana in the Island of Itrup of the Southern Kuril

Group, and from Akkesi and Muroran in Hokkaido. At Akkesi this amphipod is found in great abundance, under stones or pebbles between the tide-marks and feeding on the remains of other animals. When disturbed they crawl out sideways from their own corners under stones or the like, but never hop like *O. platensis* does. In life they are dirty yellow to light reddish brown in colour, and in the alcoholic specimens the antennae and appendages are slightly colored red.

4. *Orchestia kokuboi* UÉNO

(Pl. XII & Textfig. 9)

Orchestia kokuboi, UÉNO, 1929, pp. 7-9, fig. 1.

Body rather elongate, not strongly compressed, and colored dirty yellow to light brown. Length of body 12-13 mm.

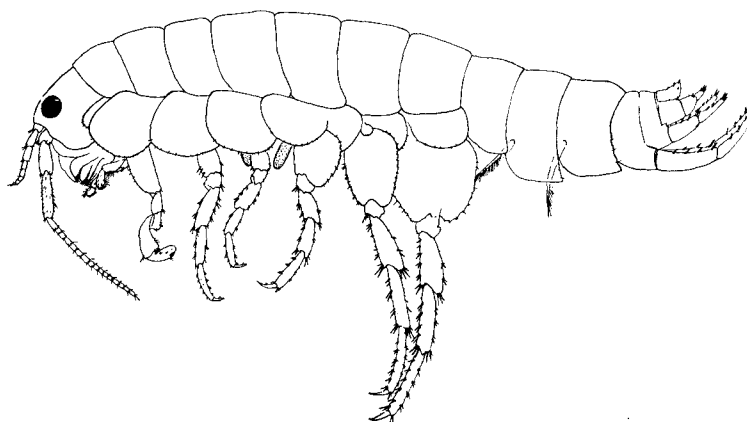


Fig. 9. *Orchestia kokuboi* UÉNO from Harukayama. Female. $\times 7$.

First side-plate small, narrowed below, front margin convex, hind margin concave, and the greater parts concealed behind by the 2nd side-plate. Second and 3rd side-plate nearly quadrate, 4th somewhat broader than deep, and as deep as 5th, the 2 lobes of which are subequal in depth, but the front lobe the larger in size, the lower margins of 2 lobes of 6th side-plate coarsely serrate. Third pleon segment with post-lateral corners nearly quadrate, with small obtuse point, margin above almost smooth.

Eyes rather large, subrotund, black in colour, situated as far apart as their diameter, or somewhat nearer together.

Both pairs of antennae are slender. First antenna extending to or a little beyond the middle of ultimate joint of 2nd pair of antenna, joints of peduncle successively longer, flagellum shorter than peduncle, with 6-7 joints. Second antenna shorter than $1/3$ the length of body, ultimate joint of peduncle subequal to the 2 preceding joints combined; flagellum longer than peduncle, 15-18-jointed.

First gnathopod of female subchelate, 4th joint with a small rounded prominence near middle of hind margin, hind margin of 5th joint distally produced to a rounded triangular projection, 6th joint shorter than 5th, distally dilated, the produced hind margin scabrous, palm transverse, spinulose, finger shorter than the entire distal margin of 6th joint.

Second gnathopod in female feebly chelate, 2nd joint not lamellar, 4th joint with a rounded boss at the distal hind corner, free hind margin of 5th joint scabrous, markedly expanded distally, 6th nearly as long as 5th, the rounded pellucid process on the hind distal corner extends beyond the short oblique palm, finger subequal to palm.

Of the 5 pairs of pereopods 2nd and 3rd pairs the shortest, the 1st pair comes next, and 4th and 5th pairs are considerably longer than former. The finger of the 2nd pereopod has a distinct notch, while those of the other pairs are slender and smooth in contour. Third to 5th pereopods with expanded 2nd joints, margins of which serrate and spinulose, 4th, 5th, and 6th joints of the last 2 pairs of pereopods elongate.

Rami of pleopod shorter than peduncle, with about 13 joints.

Rami of 1st uropod shorter than peduncle, those of 2nd uropod longer than peduncle, and the rami of these 2 uropods are provided with apical and marginal spines. Ramus of 3rd uropod narrow, subequal in length to the broad peduncle, and with a few setules near distal end. Telson somewhat longer than broad, slightly notched at the apex, and with spinules on the margin.

Remarks. The species was originally described by Uéno (1929) from Asamusi, Northern Japan, basing on specimens found in damp soil far above the tide-marks in a small island off Asamusi. The material before me consisted of 4 mature females, found by myself in damp places under dead leaves beside a small torrent in Mount Haruka-yama near Sapporo at a height of 700 meters. Little difference in the essential features is found between the specimens from these two localities.

The species differs from *O. platensis*, 1) in having the 2nd antenna with flagellum longer than peduncle, 2) in having the outer ramus of 1st uropod armed with both marginal and apical spines, while in *platensis* it is provided with apical spines only, 3) the palm of 2nd gnathopod of male in *kokuboi* is smooth, while in *platensis* it has 2 spinulose tubercles, and 4) the 1st gnathopod of female is very

feebly subchelate in *platensis* while it is distinctly subchelate in *kokuboi* with pellucid processes on the 4th, 5th, and 6th joints.

From *O. ditmari* the present form is distinguished by the 3-jointed palp of maxilliped which in *ditmari* the 4th joint is represented by a small tubercle, and the 1st gnathopod of female in *ditmari* is feebly subchelate and the scabrous boss is found only on the 4th joint, and the rami of pleopods in *ditmari* are provided with only 4 or 5 joints while they are about 13-jointed in *kokuboi*.

5. *Orchestia tenuimana*, n. sp.

(Pl. XIII & Textfigs. 10-11)

Length of body generally 10 mm or so, but sometimes 20 mm or more. First side-plate oblong quadrate, considerably narrower than 2nd, 2nd and 3rd somewhat rectangular, and the 5th is lozenge-shaped. Front lobe of 5th side-plate almost as deep as 4th, hind lobe of 6th considerably larger than front lobe and with an acute projection at lower end. Post-lateral corners of 3rd pleon segment obtusely produced, margin above serrulate.

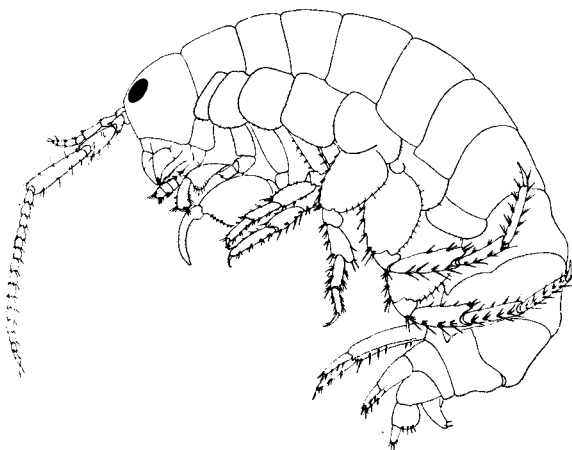


Fig. 10. *Orchestia tenuimana*, n. sp. from Suttu. Male. $\times 11$.

Eyes black, oblong oval, somewhat less than the longer diameter apart.

Both pairs of antennae are slender. First antenna extend a little beyond the penultimate joint of peduncle of 2nd antenna, joints of peduncle subequal, flagellum 3-5-jointed. Second antenna nearly $1/3$ as long as body or sometimes slightly longer, ultimate joint of peduncle elongate, nearly as long as the 2 preceding joints combined, flagellum nearly $1\frac{1}{2}$ times as long as

peduncle, composed of 11-23 strongly depressed joints, 1st of which representing 2 joints coalesced.

Mouth-parts not greatly different from the other species of the genus, and a small tubercle near the tip of 3rd joint of palp of maxilliped is probably representing the rudimentary 4th joint.

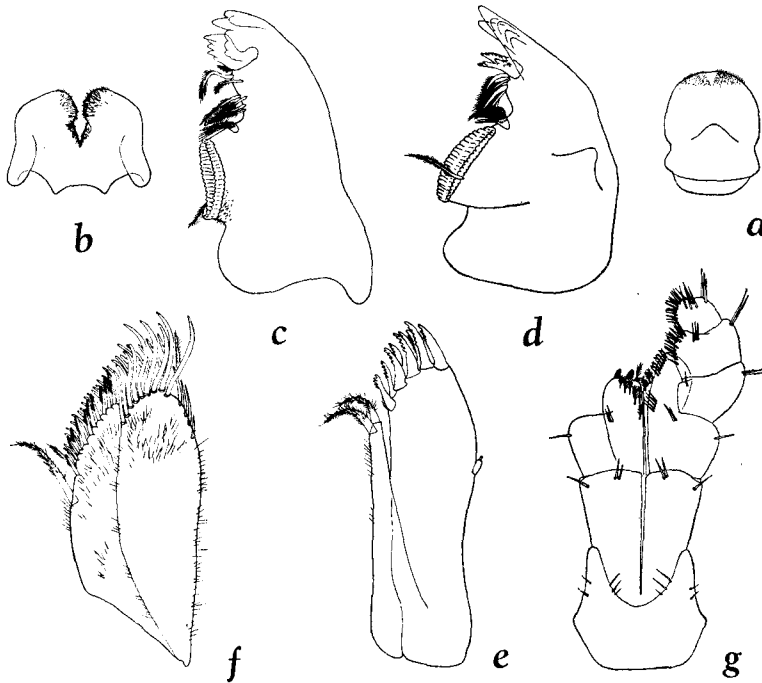


Fig. 11. *Orchestia tenuimana*, n. sp. from Suttu. Male. a, upper lip, $\times 36$; b, lower lip, $\times 36$; c, left mandible, $\times 72$; d, right mandible, $\times 72$; e, first maxilla, $\times 81$; f, second maxilla, $\times 100$; g, maxilliped. $\times 53$.

First gnathopod in male subchelate, 4th joint with a low rounded pellucid process at the middle of hind margin, 5th joint longer than 6th, its free hind margin produced into rounded triangular pellucid process accompanied by long setules, 6th joint distally widened, posterior margin also produced as scabrous pellucid process, extending beyond almost transverse palm, which is overlapped by the finger.

Second gnathopod in male strongly subchelate, considerably larger than the 1st pair, 2nd joint distally widened, 3rd with the front margin produced as a round lobe, 5th joint completely masked behind by 4th, 6th massive, piri-form, hind margin half as long as front margin, both slightly convex, palm oblique, almost straight and spinulose, with a shallow groove on inner surface

of defining angle to receive the strongly curved finger which matches the palm in length.

First gnathopod in female subchelate, 5th joint with a semicircular process near the middle of free hind margin, 6th joint somewhat shorter than 5th, parallel-sided, hind margin almost straight, armed with fine setules, palm transverse, finger matching palm.

Second gnathopod in female feebly chelate, 2nd joint expanded in front, hind margin of 4th, 5th, and 6th joints convex and scabrous, extending in the 6th joint beyond the strongly oblique palm, which is slightly shorter than finger.

First to 3rd pereopods nearly equal in length, while 4th and 5th considerably larger than the preceding pairs. Finger of 2nd pereopod indistinctly notched behind. Second joints of 3rd to 5th pereopods broadly expanded, with spines on front margin and crenulate on hind margin, which is provided with a shallow excavation on hind margin in the 3rd pereopod. The 4th and 5th joints of the posterior 3 pairs of pereopods are not markedly dilated.

Pleopods much degraded, considerably small in size, rami shorter than $1/3$ the peduncle, single-jointed, with 2 to 4 plumose setae on the apices of both rami.

First uropod with rami subequal, slightly shorter than peduncle. Rami of 2nd uropod also subequal in length to each other, and somewhat longer than peduncle; rami of 1st and 2nd uropods with spines on upper margins and on the apices. Peduncle of 3rd uropod greatly dilated, ramus narrow, shorter than the former, with several minute setules near apex. Telson longer than wide, narrow triangular in shape, slightly emarginate at apex, and with a few apical and marginal spines.

Remarks. The form is related to *O. traskiana* Stimpson reported from San Francisco, but the latter is distinguished from the former by the character of both pairs of antennae, and in the absence of pellucid lobe on the 4th joint of the 1st gnathopod in female, and especially in the structure of pleopods.

This new species is discriminated from *platensis* by the longer flagellum of 2nd pair of antenna, the degraded pleopods, the indistinct notch of finger of 2nd pereopod, in having pellucid lobes on the 4th, 5th, and 6th joints of 1st gnathopod of male which in *platensis* are found only on the 5th and 6th joints, and in that the 1st gnathopod in female is distinctly subchelate in male of *tenuimana* while it is very feebly subchelate in *platensis*.

From *ditmari* the present species differs in the pleopod, in the 1st gnathopod of male having a process on the 4th joint which is wanting in *ditmari*, and in the 1st gnathopod of female with scabrous process on the 5th joint which is also absent in *ditmari*.

The species is further separated from *kokuboi* by the rudimentarily 4-jointed maxilliped palp, the degraded pleopod, the 1st

gnathopod of male is provided with pellucid lobes on the 4th, 5th, and 6th joints of which the one on the 4th joint is wanting in *kokuboi*, and in that the similar lobes of 1st gnathopod of female are found in *tenuimana* on the 5th and 6th joints, while in *kokuboi* it is found, moreover, on the 4th joint.

This species was found living among seaweed washed ashore at Rumoe, Masike, Otaru, Suttu, and Muroran, in Hokkaido.

6. *Orchestia solifuga*, n. sp.

(Pl. XIV & Textfig. 12)

Body rather tumid, about 13 mm long. Side-plates rather large, 1st very small, nearly twice as deep as broad, 2nd to 4th subequal, rounded rectangular in shape, front and hind lobe of 5th side-plate almost equal in size and as deep as 4th and hind lobe of 6th. Third pleon segment with the post-lateral corner obtusely produced, and the hind margin slightly serrulate.

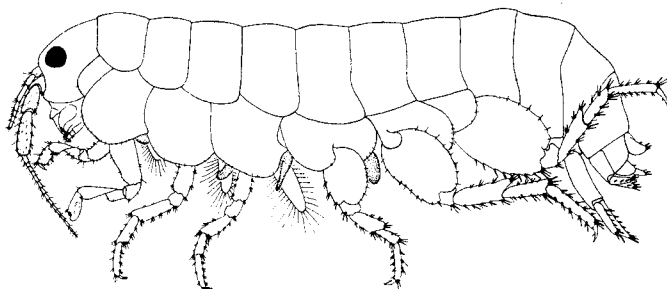


Fig. 12. *Orchestia solifuga*, n. sp. from Akkesi. Female. $\times 7$.

Eyes rounded, deep brown in colour, wider than their diameter apart.

First antenna reaching half-way along ultimate joint of peduncle of 2nd antenna, ultimate joint of peduncle longer than the preceding 2 joints which are subequal to each other, flagellum 5-jointed, shorter than peduncle. Second antenna about $1/4$ as long as body, ultimate joint of peduncle longer than the 2 preceding joints combined, flagellum longer than peduncle, 13-16-jointed.

First gnathopod in male subchelate, 4th joint with a low tubercle near middle of hind margin, 5th longer than 6th, its free hind margin strongly produced to rounded prominence, which extend almost half-way along the hind margin of 6th joint, the distal half of hind margin also markedly bulging beyond the short, slightly oblique palm, finger matching palm.

Second gnathopod in male strongly subchelate, larger than the 1st pair, 2nd joint not greatly widened, 3rd joint lobed, 6th joint oblong ovate, palm almost straight, longer than hind margin, finger elongate, its evenly curved tip concealed externally by the defining angle.

First gnathopod in female almost simple, without any scabrous projections on hind margin, 6th joint shorter than 5th, front and hind margins paralleled, finger longer than transverse palm.

Second gnathopod of female feebly chelate, 2nd joint slightly produced in front, 4th, 5th, and 6th joints with hind margins bulging, in the 6th joint the pellucid process extend far beyond the strongly oblique palm, finger short, its curved apex received by a small notch at the distal end of palm.

First to 3rd pereopods successively shorter, but 4th and 5th pereopods markedly larger than the preceding ones. Finger in 2nd pereopod slightly notched on hind margin, and 2nd joints of 3rd to 5th pereopods greatly expanded with both anterior and posterior margins serrulate and spinulose. Gills sinuously curved, in some cases with a side-branch making the letter E.

Rami of pleopods subequal to peduncle, with 7-8 short joints. First and 3rd uropods with the rami shorter than peduncle, while in the 2nd uropod the rami are subequal to peduncle. The rami of these 3 pairs of uropods are provided with both apical and marginal spines. The telson is as broad as long, rounded triangular in shape, slightly notched at apex, and with several setules on the margin.

Remarks. *Orchestia selkirkii* Stebbing from Juan Fernandez seems to be the nearest ally to this new species, but the two are separated by differences in the 2nd antenna, 1st gnathopod in female, and in the 2nd gnathopod in male.

The species is also related rather near to *O. traskiana* but may be distinguished from it by the 1st pair of antennae extending beyond the end of penultimate joint of 2nd antenna, ultimate joint of peduncle is much longer than the penultimate, and by the characters of both pairs of antennae. From *O. humicola* which was only once reported from Japan, without mentioning the exact locality, is different in the characters of antennae and gnathopods and especially in that the outer ramus of 1st uropod of *humicola* is provided with only apical spines, and the ramus of the 3rd uropod is conical and with an apical spine only.

The points of distinction of the present species from the 4 forms described above are as follows: from *platensis*, 1) marginal spines on the outer ramus of 1st uropod, and 2) pellucid process on the 4th joint of the male 1st gnathopod is present in *solifuga*, while it is absent in *platensis*; from *ditmari*, 1) by the possession of hind process on the 4th joint of the 1st gnathopod in male; from *kokuboi*, 1) the hind margin of the 1st gnathopod of male is lobed on the 4th, 5th, and 6th joints in *solifuga*, while in *kokuboi* only on the 5th and 6th joints, and 2) the 2nd gnathopod of female is almost simple in

solifuga, but is distinctly subchelate in *kokuboi*; from *tenuimana*, 1) in *tenuimana* the palp of maxilliped is rudimentarily 4-jointed while in *solifuga* it is only 3-jointed, 2) the pleopod of *tenuimana* is degraded, with only 1-jointed rami, that of *solifuga* is 7-8-jointed, 3) the female 1st gnathopod is almost simple, with no pellucid lobes behind, but in *tenuimana* it is feebly subchelate and lobed on the 5th and 6th joints.

This amphipod was found living in damp places under fallen leaves on a small hill near the Akkeshi Marine Biological Station in Hokkaido.

Genus *Talorchestia* DANA

Similar to *Orchestia*, except that the 1st gnathopod in female is simple, instead of subchelate.

7. *Talorchestia brito* STEBBING

(Pl. XV & Textfigs. 13-15)

Talorchestia brito, STEBBING, 1891, pp. 324-328, pl. 15; 1906, pp. 552-553.

Back of body moderately broad, abdomen bilaterally compressed, smooth on the dorsal surface, but the appendages are strongly armed with many short spinules.

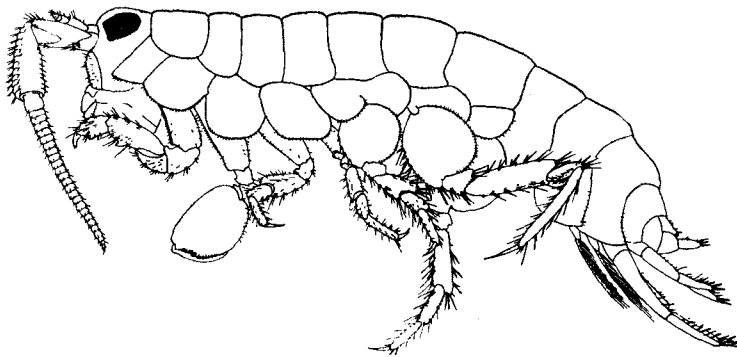


Fig. 13. *Talorchestia brito* STEBBING from Tomakomai. Male. $\times 6$.

Eyes black, rather large, nearly semi-circular in outline, with the hind margin strongly convex and the front margin almost straight, situated about their diameter apart.

Lower margin of side-plate fringed with numerous setules. First side-plate with the front margin almost straight, lower distal angle acute. Second to 4th side-plates successively larger and similar in shape. Front lobe of 5th side-plate as deep and as broad as hind lobe. Third pleon segment with the post-lateral angle almost quadrate, with a spinule at the corner, the margin above indistinctly serrulate.

First antenna not reaching end of penultimate joint of 2nd antenna, 3 joints of peduncle subequal, flagellum 5-jointed, less than half as long as peduncle. Second antenna shorter than half the body in length, peduncle robust, ultimate joint longer than the 2 preceding joints combined, antepenultimate joint with lobed terminal margin, flagellum longer than peduncle, with 27-29 broad depressed joints.

Palp of 1st maxilla 1-jointed, tipped by a small spine. Maxilliped with 3-jointed palp.

First gnathopod in male feebly subchelate, 2nd joint channelled in front for reception of carpus when reflexed, 5th joint not much shorter than 2nd, with a narrowly rounded protuberance near the middle of hind margin, 6th joint half as long as 5th, more spiny, produced at the lower hind corner, palm short, finger long, with an upright spinule and a small rounded projection at the base and extends much beyond palm.

Second gnathopod in male strongly subchelate, 2nd joint widest near middle, 4th joint short, almost square in shape, with high conical projection on hind margin, 6th joint massive, longer than broad, front margin twice as long as hind margin, both evenly convex, palm much oblique, spinulose, evenly convex, and continues to the spinuliferous hind margin without clear demarcation between the two; finger strongly curved near apex, adapted to a shallow groove on the posterior surface of hand, and with a low prominence near finger-hinge fitting into an excavation in the palm.

First gnathopod in female simple, nearly of the same structure as that in male, except that the 5th and 6th joints are not provided with pellucid processes and that the 6th joint is narrowed distally.

Second gnathopod in female feebly chelate, 2nd joint with convex lamellar expansion in front, 4th joint conically produced behind, 5th and 6th each with a membranous process behind, which in 6th joint extends as a subacute projection far beyond the longitudinal palm, finger minute, matching the palm in length.

Second pereopod the smallest of the 5 pairs of pereopods, 1st and 3rd come next, and 4th and 5th are markedly larger than the former three. Fingers of all the pereopods each with a seta on inner margin, those of 2nd and 3rd pereopods abruptly narrowed distally from the seta. Second joints of 3rd to 5th pereopods expanded; in the 3rd pereopod the joint is subcircular, in the 4th pereopod somewhat longer than broad, and in the 5th it is almost circular, with the hind margin strongly convex.

Rami of pleopods subequal to peduncle, with 16-17 joints.

Rami of uropod are somewhat shorter than peduncle in the 1st uropod, while they are longer in the 2nd and 3rd uropods, and all of these rami are

provided with both apical and marginal spines. Telson broad and thick, wider than long, slightly emarginate at the apex, and with many spinules on the dorsal surface.

Remarks. This form was first found by Stebbing in 1891 in North Devon, Great Britain, the specific name being chosen to mark the locality. The specimens before me came from Kitahama, Osyoro, and Tomakomai, all on the coasts of Hokkaido, and differ from the original description given by Stebbing only 1) in that a small concavity of palm near the finger-hinge is occupied by a small protuberance on the finger in my specimens, while it is not occupied by any protuberance in the English specimens, and 2) in the specimens from Hokkaido a high conical soft projection is found on the hind margin of 4th joints of 2nd gnathopods of both sexes, but it is entirely absent in the English specimens.

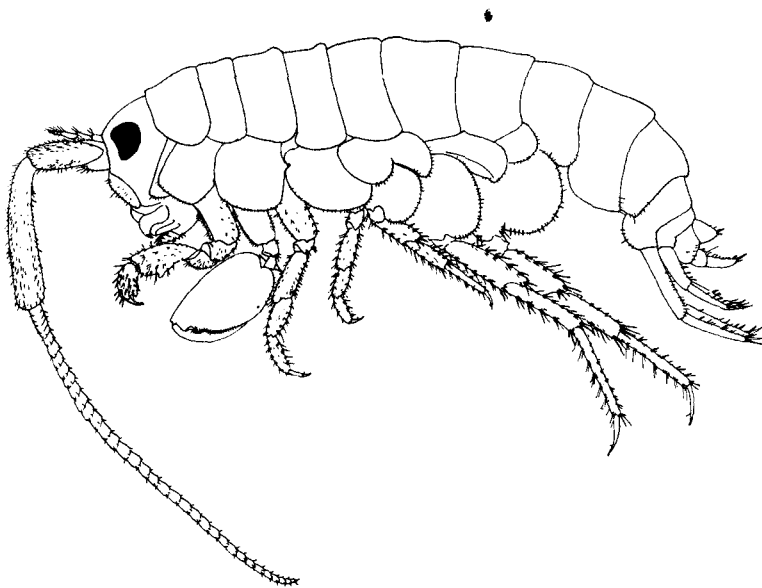


Fig. 14. *Talorchestia brito* STEBBING from Osyoro. Male. $\times 4$.

The specimens from Osyoro (Fig. 14) are considerably larger in size compared with those from other localities, attaining 28 mm in body length, with the 2nd antennae longer than body, being 42 mm long and 44-jointed, and the notch on the palm of 2nd gnathopod

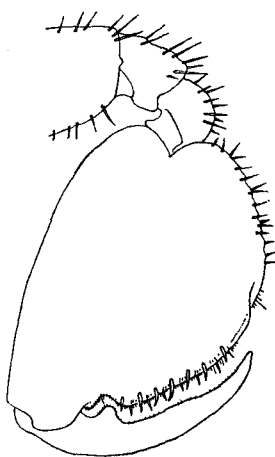


Fig. 15. *Talorchestia brito* STEBBING from Osyoro. Inner view of distal joints of second gnathopod in male; a tubercle on the finger and the corresponding concavity in the palm are very marked. $\times 9$.

in male and the protuberance of finger fitting to it (Fig. 15) are markedly larger than in specimens from other places. Specimens collected in other localities in Hokkaido are generally 10–16 mm in length, with the ground colour of body yellowish white irregularly banded and bordered with beautiful purple, blue, and brown. The orchestids live in rather deep longitudinal pits just below the high-water mark, and they swim rapidly out of their pits into the surging wave. The hopping is very energetic, and their skill in digging their burrows being quite remarkable, it is not an easy task for us to get a number of them.

Genus *Hyale* RATHKE

Fourth side-plate much deeper than 5th. First antenna longer than peduncle of 2nd antenna. Palp of 1st maxilla 1-jointed, reaching to base of apical spines of outer plate. Palp of maxilliped 4-jointed, the 4th joint unguiform. Second gnathopod in male, 5th joint small, masked behind by 4th. Second gnathopod in female, 5th joint produced behind between 4th and 6th joints. Third uropod uniramous. Telson divided.

Key to species

- | | | | |
|---|---|--|----------------------------------|
| 1 | { | Hind margins of 4th and 5th joints in 3rd to 5th pereopods armed with spines | <i>gracilis</i> , n. sp., p. 282 |
| | | Hind margins of 4th and 5th joints unarmed | 2 |
| 2 | { | Sixth joints of pereopods with obliquely striated spines near finger-hinge | <i>Dollfusi</i> , p. 280 |
| | | Sixth joints of pereopods not provided with these spines | 3 |
| 3 | { | Finger of pereopods minutely pectinate | <i>novaezealandiae</i> , p. 276 |
| | | Finger of pereopods smooth, not pectinate | <i>schmidtii</i> , p. 278 |

8. *Hyale novaezealandiae* THOMSON

(Pl. XVI & Textfig. 16)

Hyale prevostii (in part), DELLA VALLE, 1893, pp. 519–522, pl. 2, fig. 6, pl. 16, figs. 23–42.

Hyale novaezealandiae, STEBBING, 1906, p. 567.

Body rather large, not strongly compressed except in the abdomen, with thick covering of cuticle and strong armature of spines and setae. Length of body 10–22 mm.

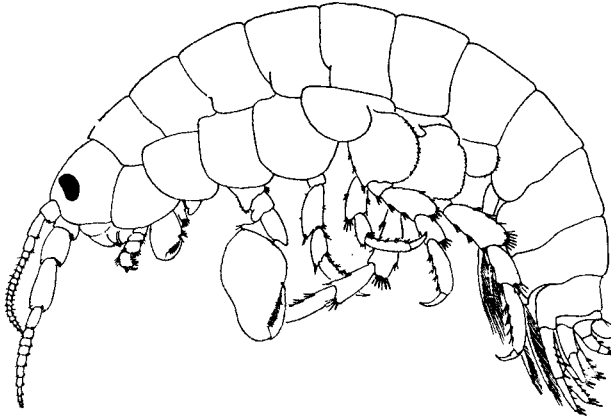


Fig. 16. *Hyale novaezealandiae* THOMSON from Akkesi. Male. $\times 5$.

Eyes reniform, nearer together than their length.

Side-plates with smooth lower margins, 1st to 4th successively larger, 5th markedly smaller than these, half as deep as 4th. First side-plate wider below than above, with front margin straight or very slightly concave, 2nd to 4th side-plates subquadrangular, wider above than below, and an oblique backward projection is found above the middle of hind margin in each of the 1st to 4th side-plates. Fifth side-plate half as deep as 4th, the hind-lobe as deep as front lobe but somewhat smaller in size, with the posterior margin coarsely serrate as in the following 2 side-plates. Post-lateral corner of 3rd pleon segment with an obtusely produced point, margin above sinuate, almost smooth.

First antenna longer than peduncle of 2nd antenna, joints of peduncle successively shorter and narrower, flagellum slightly longer than peduncle, with 12–15 depressed joints. Second antenna about $\frac{1}{3}$ to $\frac{1}{4}$ the body in length, peduncle stout, ultimate joint longer than penultimate, gland-cone low but distinct, flagellum subequal in length to peduncle, with 11–13 short and broad joints.

Upper lip with distal margin truncate. Palp of 1st maxilla rather large and slender, extending a little beyond the base of apical spines of outer plate, and is surmounted by a single seta. Maxilliped with 4-jointed palp, the 4th joint unguiform, nearly as long as 3rd joint, and fringed on inner margin.

The 2 pairs of gnathopods are subchelate in both sexes. First gnathopod in male, 2nd joint narrow at base, rapidly widened behind to the middle, distal margin of 4th joint slightly produced with shallow concave surface below, fitting to the markedly produced cup-like process of hind-margin of 5th joint,

the process extending beyond the distal hind corner of 4th, 6th joint oblong, nearly twice as long as 5th, hind margin half as long as front margin, with a subapical low setuliferous process, palm oblique, almost straight, with spines at the defining angle between which the point of finger rests, finger matching palm.

Second gnathopod in male, front margin of 2nd joint produced in front and below, 3rd joint with small but distinct rounded lobe in front, 4th joint subacutely produced below and completely masks the very short 5th joint from behind together with the proximal hind margin of 6th joint, 6th joint massive, piriform, front and hind margins strongly convex, the former 3 times as long as latter, palm strongly oblique, almost smooth, defining angle somewhat produced beyond palm, with a tuft of setules and 2 spines, and with a small pocket near the bases of latter into which the point of finger is adapted.

First gnathopod in female similar in structure to that of male, except that the 2nd joint is gradually widened distally, and the anterior margin is produced in front as a thin lobe.

In the 2nd gnathopod of female the anterior margin of 2nd joint is lamellar and produced a little beyond the distal end of that joint, but the 3rd joint is not provided with a rounded process in front as in male; 4th joint subacutely produced distally, hind margin of 5th extending between the 4th and 6th and slightly beyond the hind distal corner of 4th; 6th and 7th joints are almost the same as in male except that they are less massively constructed.

Of the 5 pairs of pereopods the anterior 2 pairs are rather slender compared to the posterior 2 which are stouter, of which the 3rd pereopod is the shortest of the 5 pairs and the 4th and 5th are markedly larger than the other. The 2nd joints of the posterior 3 pairs of pereopods are greatly enlarged behind and below, extending beyond the distal margin of these joints, the produced hind margin coarsely serrate, with a slight submedian notch in the 3rd and 4th. The 4th and 5th joints of these 3 pairs of pereopods are widened behind, and their hind margins are strongly spined in the 4th joint, but smooth in the 5th. The concave margin of fingers in all the 5 pairs of pereopods are minutely pectinate, each with a rather distinct seta near the base of nail.

Rami of pleopods twice as long as peduncle, 19-20-jointed. Rami of uropods are subequal to peduncle in the 1st and 3rd uropods, but longer in the 2nd, and all the rami are provided with both apical and marginal spines. Telson cleft to base, widest near the middle of its length, each lobe triangular in shape and the inner margin is straight.

Remarks. This form is rather commonly found among algae near the low-water mark in the following localities: Akkesi, Birō, Saruru, Osyoro, all in Hokkaido, and Kosiki-zima in Kyūsyū.

9. *Hyale schmidt* (HELLER)

(Pl. XVII & Textfig. 17)

Hyale schmidt, STEBBING, 1906, p. 571; CHEVREUX, 1925, pp. 288-289, fig. 299.

Hyale prevosti (in part), DELLA VALLE, 1893, pp. 519-522, pl. 2, fig. 6, pl. 16, figs. 23-42.

Body not large-sized, 8-10 mm in length, back rounded, and colored dark brown.

Eyes rounded, black in colour, wider apart than their diameter.

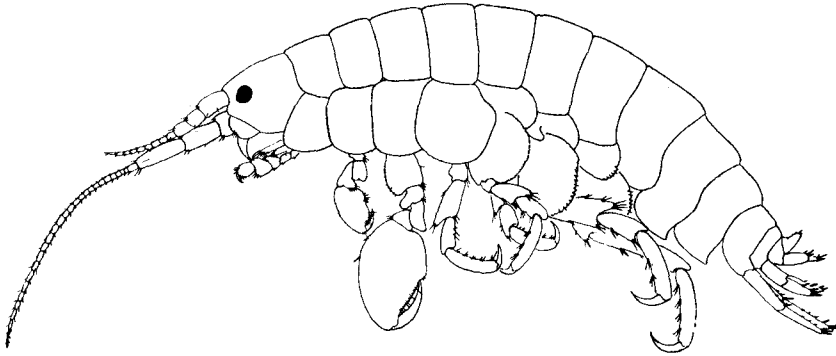


Fig. 17. *Hyale schmidtii* (HELLER) from Osyoro. Male. $\times 10$.

Side-plates rather deep, 1st side-plate widened distally, 2nd to 4th deeper than broad, with no backward projections on hind margin, 5th half as deep as 4th, with 2 subequal lobes. Third pleon segment with quadrate post-lateral corner.

First pair of antennae extending beyond the ultimate joint of 2nd antenna, joints of peduncle considerably decreases in length and breadth distally, flagellum longer than peduncle, 9-15-jointed. Second antenna half as long as body, ultimate joint subequal in length to the preceding two combined, flagellum more than twice as long as peduncle, with 20-32 joints.

Distal margin of upper lip convex. Palp of 1st maxilla rather elongate, slightly surpassing the base of apical spines of outer lobe, and tipped with a minute seta. Fourth joint of palp as long as 3rd, unguiform, inner margin fringed with many long setae.

Male 1st gnathopod with 4th joint very slightly produced distally, hind lobe of 5th short, not extending beyond the distal hind corner of 4th, 6th somewhat triangular in shape, broadest at base, front margin slightly convex, unarmed, hind margin almost straight or slightly concave, with the proximal hind corner subquadrate, slightly produced proximally, finger strongly curved, overlapping the ill-defined, very oblique palm, 2 spines at the proximal end of palm.

Second gnathopod in male, distal half of 2nd joint with lamellar expansion in front, 3rd joint also with a marked frontal lobe, lower end of 4th adapted to the proximal hind margin of 6th, which is oval in shape, with 2 spines near the base of front margin, hind margin almost straight, $1/3$ as long as front

margin, palm straight, oblique, with 2 spines and a pocket for finger point at the defining angle, finger matching palm in length.

First gnathopod in female, 2nd joint produced in front at the distal end, hind lobe of 5th extending a little beyond the hind distal corner of 4th, 6th oblong, twice as long as 5th, front margin convex, hind margin concave, the latter with a row of setules near the middle, palm oblique, defined by 2 spines, finger overlapping palm.

Second gnathopod in female nearly as in the 1st pair except that the setules on the hind margin of 6th joint are in 2 groups and not in one.

Second joints of 3rd and 4th pereopods are notched in the middle of crenulate hind margin, that of the 4th pereopod longer than those of *H. novaezealandiae*. The hind margins of 5th joints in the 3rd to 5th pereopods are unarmed, and the finger of all the pereopods are quite smooth on inner margin provided each with a very small fine seta near the end.

Rami of 1st and 2nd uropods much longer than peduncle, with both apical and marginal spines. Ramus of 3rd uropod shorter than peduncle, with apical spines only. Telson divided toward base, widest near base, apex bluntly pointed.

Remarks. This species is different from the preceding species in the following points: 1) in *schmidti* the 1st gnathopod of male has the hind lobe of 5th joint never extending beyond the distal hind corner of 4th joint, the 6th joint is narrowed distally and the palm is ill-defined, but in *novaezealandiae* the hind lobe of 5th joint extends beyond the said corner of the 4th joint, the 6th joint is broader distally than proximally, and the palm is well-defined, 2) the front margin of the 4th joint is provided with 2 spinules in *schmidti*, while the margin is unarmed in the other species, 3) the 4th joint of the female 2nd gnathopod in *schmidti* is oblong quadrate while it is broadest near base and is narrowed distally in the other, 4) fingers of all the pereopods in *schmidti* have smooth inner margin, and each provided with a minute seta, but in *novaezealandiae* they have minutely pectinate inner margins and the setae are distinct, 5) and in that the rami of the 1st and 2nd uropods are much longer than peduncles in the former and subequal in length in the latter.

The orchestids were found under stones or among seaweed in the tide-pool, at Osyoro, Syamani, and Muroran in Hokkaido, and at Seikiho, Quelpart I. in the Korean Strait.

10. *Hyale Dollfusi* CHEVREUX

(Pl. XVIII & Textfig. 18)

Hyale Dollfusi, CHEVREUX, 1925, pp. 287-289, fig. 298.

Body bilaterally compressed, small in size, 4.5–5.5 mm in length.

Eyes rounded, apart from each other by a distance longer than their own diameter.

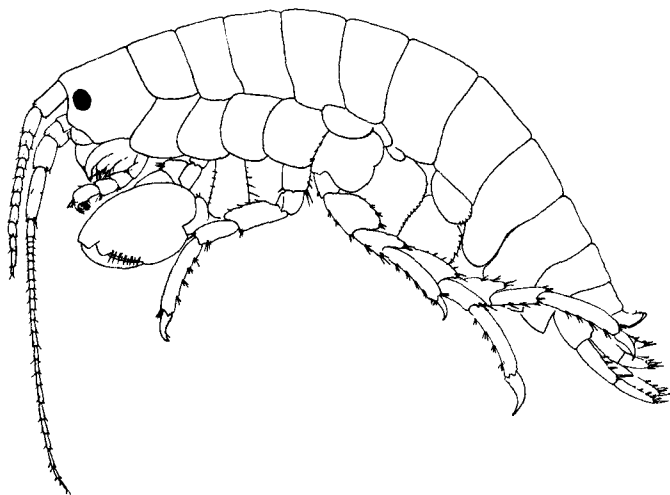


Fig. 18. *Hyale Dollfusii* (CHEVREUX) from Masike. Male. $\times 18$.

First side-plate produced in front, widest at the lower end, 2nd to 4th subquadrate, successively larger posteriorly, front lobe of 5th as deep as hind lobe but broader, and half the 4th in depth. Post-lateral corner of 3rd pleon segment nearly quadrate, the point slightly produced.

First antenna larger than peduncle of 2nd antenna, 1st joint of peduncle subequal in length to the succeeding 2 joints combined, flagellum longer than peduncle, 7–11-jointed. Second antenna half as long as body, ultimate joint of peduncle subequal to the preceding two combined, flagellum twice as long as peduncle, 21–27-jointed.

First maxilla with palp surpassing the apex of outer plate. Fourth joint of palp of maxilliped as long as 3rd, with a row of fine setules on inner margin.

First gnathopod of male, hind lobe of 5th joint broad, extending a little beyond the 4th joint, 6th twice longer than 5th, wider distally than proximally, front margin convex and unarmed, hind margin with a setuliferous tubercle near middle, which in some individual is produced distally into a prominent tooth-like projection near the distal end of hind margin (Pl. XVIII, Fig. i), palm oblique, convex, with a spine near the defining angle, finger curved, as long as palm. Second gnathopod in male with marked frontal projections in 2nd and 3rd joints, 4th subacutely produced behind, 5th completely masked by the 4th, 6th oblong oval, both the front and hind margins convex and unarmed, the former 3 times as long as latter, palm very oblique, almost straight, with a tubercle near finger-hinge, and a small pocket on inner surface opposite the rather indistinct defining angle, finger curved, as long as palm.

First gnathopod in female nearly alike in structure to that in male, except that the 6th joint is oblong, nearly twice longer than wide, with a low setuliferous elevation near middle of hind margin. The 2nd gnathopod in female differs nothing from the 1st pair except in size, the former being somewhat larger than the latter.

Second joints of 3rd to 5th pereopods are greatly expanded behind and below, extending much beyond the distal ends of 3rd joint, especially marked in the 4th pair, and a small notch is found near the middle of hind margin of 2nd joint in each of the 3rd and 4th pereopods. Hind margins of 5th joints are unarmed in 3rd to 5th pereopods, the finger of all the pereopods are very indistinctly pectinate, accompanied by a subterminal seta, and 2 spines of 6th joint near the finger-hinge of all the pereopods are obliquely striated.

Rami of 1st and 2nd uropods are much longer than peduncle, and armed with apical and marginal spines, while the ramus of 3rd uropod is subequal to peduncle and is surmounted by 5-6 apical spines. Telson triangular in shape, as long as broad, divided to base, and almost unarmed.

Remarks. This form is distinguished from the two preceding species, *novaezealandiae* and *schmidt*i, in being the body strongly compressed, and in the possession of obliquely striated spines on the 6th joints of all the pereopods, and from *novaezealandiae*, moreover, in having longer antennae, and from *schmidt*i in having the 6th joint of 1st gnathopod in male distally widened which in the latter species is narrower distally, and in that the front margin of 6th joint of male 2nd gnathopod is provided with 2 spinules, while the front margin of *schmidt*i is smooth.

The localities are as follows; Muroran, Osyoro, Masike in Hokkaido (among seaweed), and Kosiki-zima in Kyūsyū.

11. *Hyale gracilis*, n. sp.

(Pl. XIX & Textfig. 19)

Body slender and strongly compressed bilaterally, rather small in size, from 7 to 10 mm in length.

Eyes elongate elliptic in shape, closely approximated together near the antero-dorsal margin of the head.

Side-plates somewhat alike in structure to those of *Hyale novaezealandiae*, but the backward projections of hind margin in the 1st to 4th side-plates is less marked, and the 4th side-plate broader than deep with the lower hind angle produced behind as a broad triangular lobe, while the 4th side-plate of *novaezealandiae* is deeper than broad and the distal hind corner is broadly truncate; front lobe of 5th side-plate $\frac{2}{3}$ the 4th in depth, shallower than the hind lobe. Post-lateral corner of 3rd pleon segment almost quadrate, with an obtusely produced point, margin above nearly smooth.

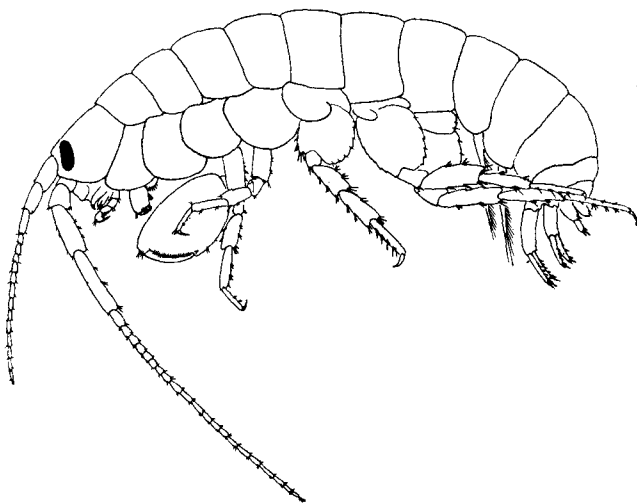


Fig. 19. *Hyale gracilis*, n. sp. from Botel Tobago. Male. $\times 14$.

Both pairs of antennae are slender. The 1st pair much longer than peduncle of 2nd antenna, peduncle half as long as flagellum which is 14-17-jointed. Second antenna nearly twice as long as 1st antenna, and longer than half the body in length, flagellum about twice as long as peduncle, with 24-30 joints.

Mouth-parts are rather similar to those of *novaezealandiae* except that the upper lip is strongly convex distally, and that the 4th joint of palp is armed with only 3 or 4 spinules on the curved margin, which is bordered with a number of setules in *novaezealandiae*.

The gnathopods are subchelate both in male and in female. The 1st pair in male has 5th joint longer than in *novaezealandiae*, and the lobe on the hind margin of that joint is broader, the 6th joint oblong, twice as broad as long, front margin convex, hind margin concave, the latter with a row of setules near the middle.

The 2nd gnathopod in male is not so massive as in the latter species, with narrow lamellar front margin in the 2nd joint but none in the 3rd, 6th joint elliptic, front margin twice as long as hind margin, palm oblique, evenly curved.

In female the gnathopods are slender than in *novaezealandiae*, each joint being relatively longer, posterior lobes of 5th joints broader, and the 6th joints are more oblong.

The 2nd joints of the 3rd to 5th pereopods are longer compared to those of *novaezealandiae*, and their hind margins are evenly convex, or very slightly notched near the middle. The posterior 3 pairs of pereopods are evenly armed with spines on the margin, not with groups of spines as in the former species. The fingers of all the pairs are quite smooth on the curved margin, and each are provided with a subterminal seta.

The rami of pleopods are somewhat longer than peduncle, and are about 13-jointed.

The uropods and telson are essentially of the same structure as those of the former species.

Remarks. This new species is clearly distinguished from the other three species described above in the slender and strongly compressed body, elongate elliptic eyes which are closely approximated together, poor armature of setae on inner margin of 4th palpal joint of maxilliped, spinose hind margin of 5th joints in the 3rd, 4th, and 5th pereopods, and in the 4th side-plate which is of peculiar shape.

The species also differs from *novaezealandiae* in the longer antennae, in the smooth inner margin of fingers of pereopods, and in that the 5th joint of the 1st gnathopod in male is broadly produced behind but not extending beyond the distal hind corner of the 4th joint, while in the latter species the process narrowly extends beyond the said corner of the 4th joint, and the 3rd joint of the 2nd gnathopod of male is provided with a rounded projection in front which is wanting in *gracilis*.

Hyale schmidtii is distinguished from the present species in that the hind process of 5th joint in the 1st gnathopod in male is narrow in *gracilis* while it is broad in *schmidtii*, and the 6th joint is distally narrow in the former, but is parallel-sided in the latter.

The species *Dollfusi* is different from *gracilis* by the possession of obliquely striated spines near the distal end of the 6th joints of pereopods which are absent in *gracilis*, and by the distally widened hand of the male first gnathopod which is oblong and parallel-sided in the latter species, and in lacking the round frontal process on the 3rd joint of 2nd gnathopod in male.

The specimens of this new form were collected at Imaururru, Botel Tobago in Formosa, under stones or in sand, and on the rocky beach near the Amakusa Marine Biological Station in Tomioka, Kyūsyū.

Genus *Parhyale* STEBBING

Like *Hyale*, except that the 3rd uropod has a rudimentary inner ramus.

12. *Parhyale kurilensis* IWASA

Parhyale kurilensis, IWASA, 1934, pp. 1-7, pls. 1-2.

The species was originally described by the present author basing on specimens from the Island of Urup of the Middle Kurile group. Many specimens referable to this species were later collected at Akkesi and Syamani in Hokkaido, and proved to be essentially the same to the type specimen. When alive they are deep olive black in colour and the eyes are bright red, but in alcohol they turn light yellow with black eyes. A group of specimens collected between tide-marks at Akkesi are smaller in size compared with the type, being 21 mm long or so, but they are sexually mature, and differ markedly from the type specimen in having broad back and feebly carinated pleon segments.

Genus *Allorchestes* DANA

Similar to *Hyale*, except that the 2nd gnathopod in male has the 5th joint produced between 4th and 6th. Telson more or less divided. The palp of 1st maxilla sometimes reaches to the base of apical spines of outer plate, but sometimes not reaching to it.

Key to species

- 1 { Second antenna strongly feathered below *plumicornis*, p. 289
- { Second antenna not feathered below 2
- 2 { Pleon segments not strongly carinated *malleolus*, p. 285
- { Pleon segments strongly carinated *malleolus carinatus*, n. subsp., p. 288

13. *Allorchestes malleolus* STEBBING

(Pl. XX & Textfigs. 20-22)

Allorchestes malleolus, STEBBING, 1906, pp. 582-583, figs. 99-100.

Body not large in size as a member of the family, 7-12 mm in length, moderately compressed, and armed with a few spines.

Side of head produced as a low triangular projection between the bases of 2 pairs of antennae and not truncate in front as in *Orchestia*. Eyes black in spirit, not large, rounded or elliptic in outline.

Side-plates with almost smooth margins. First to 4th rather deep, 1st not smaller than 2nd as in *Orchestia*, wider distally than at base, and the anterior margin slightly concave in front, 4th the largest of all the 7 side-plates, in 2nd to 4th the hind margin with basal excavation but without the backward projection as is found in *Orchestia* and *Talorchestia*. Fifth side-plate less than half as deep as 4th, front and hind lobes subequal in size. Post-lateral corner of 3rd pleon segment obtusely produced, and the hind margin is provided with 2 or 3 low serrations.

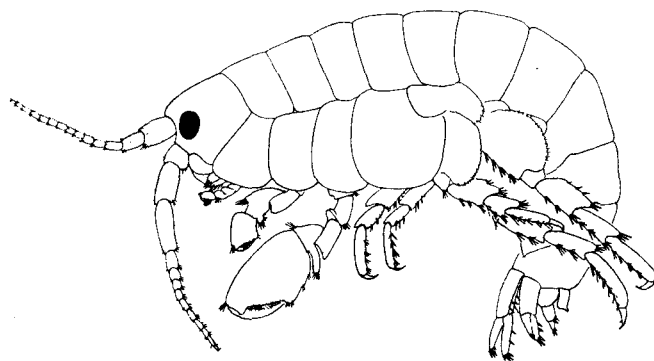


Fig. 20. *Allorchestes malleolus* STEBBING from Muroran. Male. $\times 10$.

First antenna about $3/4$ as long as 2nd antenna, 3 joints of peduncle successively shorter, flagellum $1\frac{1}{2}$ as long as peduncle, with 11-13 joints. Second antenna $1/3$ to $1/5$ as long as body, peduncle rather stout, ultimate joint somewhat longer than penultimate, flagellum subequal in length to peduncle, 10-13-jointed.

Palp of 1st maxilla larger than in *Orchestia*, but not reaching apex of outer plate. The plumose setae at the proximal end of apical spine-rows in the inner plate of 2nd maxilla not so stout as in *Orchestia*, and the maxilliped is provided with 4-jointed palp, the 4th joint of which unguiform, as long as the 3rd joint.

First gnathopod in male subchelate, 2nd joint abruptly widened toward the middle of hind margin, 3rd and 4th joints subequal in length, 4th joint slightly excavated in the middle of hind margin, the proximal and distal parts of the excavation with numerous minute denticles, 5th joint $1\frac{1}{2}$ as long as 4th, rapidly dilated subapically, with a row of spines on the widest portions on both the front and hind margins, the hind process is produced as a thin lobe enclosing a pocket to receive the denticulate process of the hind margin of 6th joint; 6th joint slightly shorter than 5th widest near base, front margin strongly convex, smooth, considerably longer than hind margin, palm short, evenly convex, defining angle somewhat elevated above the palm, the hind margin then runs transversely as long as palm, then turns abruptly nearly at a right angle toward the base. The surface of the hind margin is provided with many denticles, and 2 stout spines are found on the inner surface near the defining angle of the palm. Finger short but stout, unequally bifurcated at the end, and matching the palm in length.

Second gnathopod in male strongly subchelate, much larger than 1st gnathopod, 4th joint distal hind corner obtusely produced, the distal end hollowed to adapt the shallow cup-forming process of the 5th joint, this process is elongate, fringed with a row of setae on inner margin, and produced between the 4th and 6th joints, masking behind the evenly convex hind margin of 6th joint. The

6th joint elongate oval, front margin slightly convex, twice longer than hind margin, palm oblique, spinulose, almost straight, with 2 small palmer spines at the defining angle, hind margin somewhat longer than palm, carrying groups of spinules, at 1 or 2 points; finger closely fitting against palm, its apex received by a small pocket on inner surface near defining angle.

First gnathopod in female (Fig. 21, *a*) subchelate, 5th joint as long as 6th, widest near the distal end, process on hind margin cup-shaped, fringed with a row of setules, 6th joint slightly wider distally than proximally, with front margin evenly convex, hind margin concave with subterminal setules; palm transverse, convex, setulose, with a spine at the rectangular defining angle, finger acute, as long as palm.

Second gnathopod in female (Fig. 21, *b*) also subchelate, somewhat resembling in shape to the 1st pair; hind margin of 4th joint subacutely produced, 5th joint with prominent hind lobe, which is hollowed in front and fringed on the margin, extending nearly $\frac{2}{3}$ along the posterior margin of 6th joint, 6th joint longer than 5th, twice as long as wide, front and hind margins convex, palm transverse, slightly convex, with a spine at the rectangular defining angle; finger acute, matching palm in length.

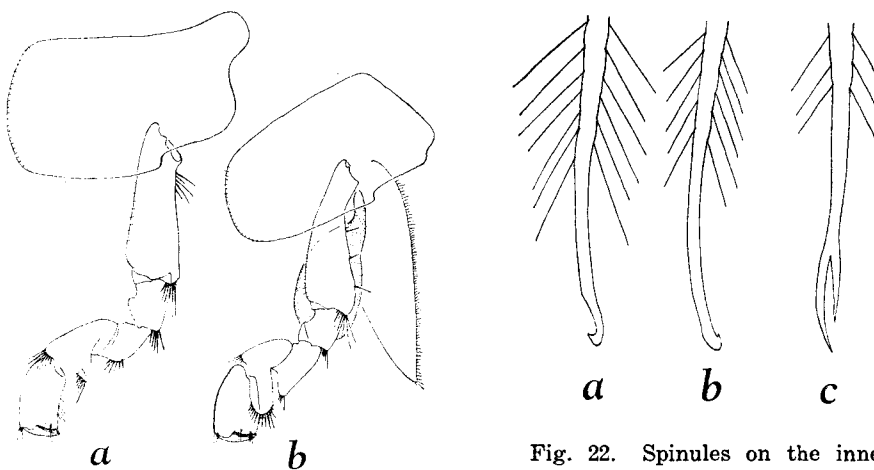


Fig. 21. *Allorchestes malleolus* STEBBING from Muroran. Female. *a*, first gnathopod, $\times 27$; *b*, second gnathopod, $\times 20$.

Fig. 22. Spinules on the inner margin of basal joint of inner ramus of pleopod. *a*, *Allorchestes malleolus* STEBBING, $\times 414$; *b*, *All. malleolus carinatus*, n. subsp., $\times 159$; *c*, *All. plumicornis* HELLER, $\times 314$.

Five pairs of pereopods are not strongly armed with spines, and the 3rd to 5th pereopods with front margins almost straight, hind margins strongly produced behind and downwards beyond the distal ends of these joints, becoming larger in size from the 3rd to 5th, nearly as broad as long in 3rd pereopod, one and a half times as deep as broad in 4th pereopod, and in the 5th pereopod

the joint is considerably larger and wider distally than proximally, the hind margins of the joints are coarsely serrate in these 3 pairs of legs.

Peduncle of pleopod 2/3 as long as rami, with 2 or 3 coupling hooks near the distal end of inner margin; rami 13-16-jointed, provided on inner margin of 1st joint of inner ramus with 4 or 5 slender spinules which are hooked at the apex (Pl. XX, Fig. *t*, and Textfig. 22, *a*). Rami of 1st and 2nd uropods small, subequal to peduncle in length, surmounted by a group of apical spinules. Telson rounded quadrangular in shape, median cleft not extending beyond the middle, and the sides are not divergent.

Remarks. The species was originally reported from Yellow Sea and Sea of Japan in 1899. Rather a large number of specimens were collected at Akkesi, Muroran and Birō in Hokkaido. They were living among seaweed washed ashore or between the rootlets of Laminarians. In life they are colored light pinkish yellow.

14. *Allorchestes malleolus carinatus*, n. subsp.

(Pl. XXI & Textfigs. 23-24)

Body enormously large in size, 33-40 mm in length, and strongly compressed bilaterally with distinct dorsal carina in the posterior half of thorax and especially in the abdomen. Each of the dorsal hind corners of the 6th pereaeon segment and of the following segments are produced backwards as a carina which increases in size posteriorly, and the anterior half of the dorsal margins in these segments are concave. Post-lateral corner of 3rd pleon segment is nearly quadrate, the margin above slightly sinuate, without spines and serrations.

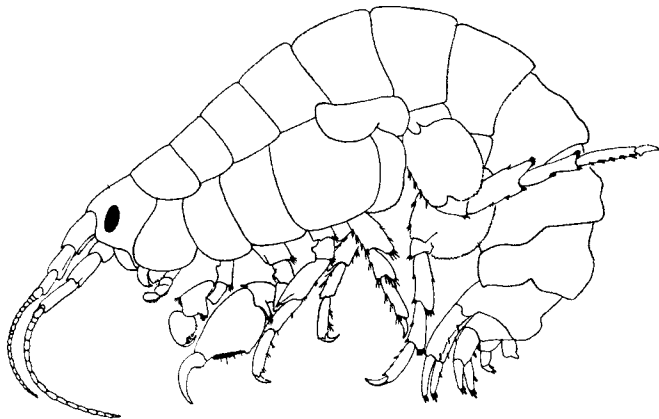


Fig. 23. *Allorchestes malleolus carinatus*, n. subsp. from Paramushir I.
Male. $\times 2.8$.

Eyes rather small compared with the size of body, elliptic, situated more than twice their longer diameter apart, at a position posterior to a rather prominent ocular lobe between the bases of antennae.

Both pairs of antennae are rather short, and the 1st pair subequal to or sometimes slightly longer than the 2nd. The flagella are 10–22-jointed in the 1st antenna, and 15–18-jointed in the 2nd antenna.

The oral appendages are shorter and broader compared with those of the type species, especially the palp of 2nd maxilla and the 4th palpal joint of maxilliped.

The hooked spinules found on the basal joint of inner ramus of pleopod are 6 in number and somewhat different in shape from those of type species (Fig. 22, *b*).

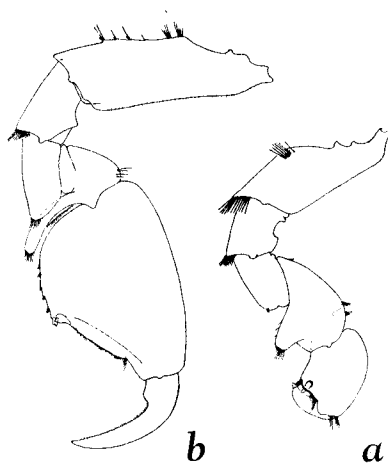


Fig. 24. *Allorchestes malleolus carinatus*, n. subsp. from Paramushir I. Male. *a*, first gnathopod, $\times 7$; *b*, second gnathopod, $\times 7$.

Remarks. The new subspecies is easily distinguished from the type species by the considerably large size of the body which is nearly 3 or 4 times larger than the latter, and by the distinct dorsal carina in the posterior half of the body. In the size of body, and in the general form, especially in the dorsal carination, the new subspecies closely resembles to *Parhyale kurilensis*, but the latter is clearly separated from the former by the divided telson and by the rudimentarily bilobed 3rd uropod. The latter species was found in Urup and the former in Paramushir, both of the Kuril Is., and it is very interesting to find that these two forms occurring in similar habitats and belonging to two different genera quite resemble in shape and size to each other.

One male and 3 females, all mature, were collected in Suribati Bay, Paramushir I. of the Northern Kuril Is.

15. *Allorchestes plumicornis* (HELLER)

(Pl. XXII & Textfigs. 25–26)

Allorchestes plumicornis, STEBBING, pp. 583–584; CHEVREUX, 1925, pp. 291–292, fig. 302.

Body slender, not greatly compressed, rather small in size, 8–10 mm long, and not strongly armed with spines.

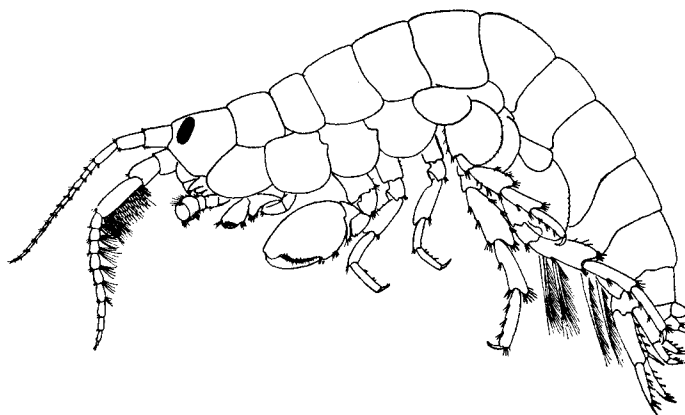


Fig. 25. *Allorchestes plumicornis* (HELLER) from Akkesi. Male. $\times 11$.

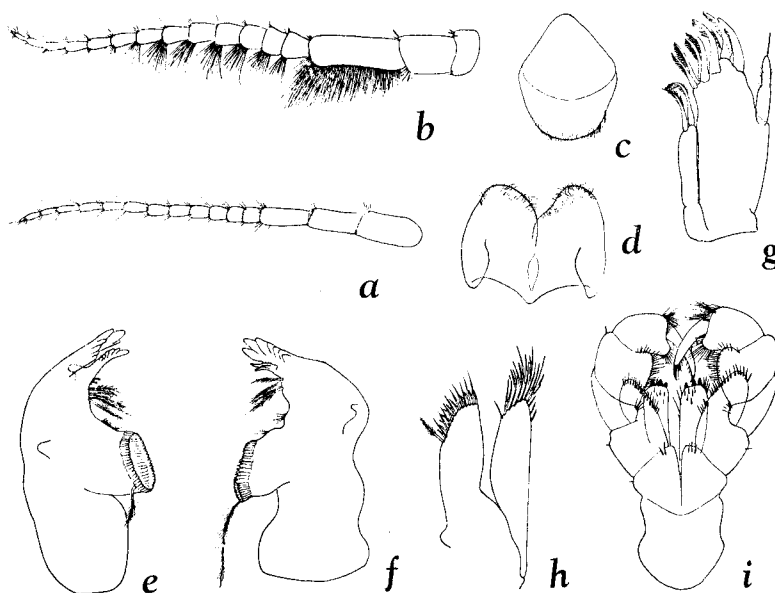


Fig. 26. *Allorchestes plumicornis* (HELLER) from Akkesi. Male. *a*, right first antenna, dorsal view, $\times 18$; *b*, left second antenna, outer view, $\times 18$. *c*, upper lip, $\times 45$; *d*, lower lip, $\times 45$; *e*, left mandible, $\times 72$; *f*, right mandible, $\times 72$; *g*, first maxilla, $\times 72$; *h*, second maxilla, $\times 72$; *i*, maxilliped, $\times 36$.

Side-plates comparatively large, 1st side-plate not greatly different in size from the 2nd, 2nd to 4th subequal in size, front lobe of 5th $2/3$ as deep as 4th, the hind-lobe shallower and shorter. Post-lateral corner of 3rd pleon segment

rounded quadrangular, hind margin sinuate, almost smooth, with a few fine setules.

Eyes moderately large, elongate elliptic in form, situated closely approximated together near the antero-dorsal margin of the head.

First antenna somewhat shorter than 2nd, 3 joints of peduncle successively shorter, flagellum $1\frac{1}{2}$ times as long as peduncle, with 11-13 joints in male and 8-9 joints in female, the joints gradually lengthening distally. Second antenna about $\frac{1}{3}$ as long as body, peduncle rather robust, ultimate joint nearly twice as long as penultimate, flagellum about twice longer than peduncle, with 12-14 joints in male and 11-12 joints in female. The lower margin of ultimate joint of peduncle and the lower distal ends of 6-7 proximal flagellar joints are each provided with a tuft of long fine setae which are longer and more numerous in male than in female.

Armature of spines and spinules in the oral appendages are poorly developed than in other species of the genus. Inner plate of 1st maxilla rather short, while the palp is large, 1-jointed, slightly constricted near middle, extends almost to the base of apical spines of outer plate, and is surmounted by a slender seta. Palp of maxilliped 4-jointed, 3rd joint expanded on both sides and strongly setose on the margin, the 4th joint unguiform, and is longer than the 3rd joint.

First gnathopod in male subchelate, 2nd joint rapidly widening to the middle of hind margin, 4th joint slightly produced on distal hind corner with a shallow excavations in front to receive the posterior lobe of 5th, the latter joint subequal to 6th in length, widest distally, the hind lobe prominent, fringed on the margin and covers the base of 6th joint from behind; 6th joint oblong, $1\frac{1}{2}$ times as long as wide, with a row of fine setules near the middle of hind margin, palm somewhat oblique, spinulose, with 2 spines at the defining angle, finger stout, as long as palm, abruptly curved to an acute point which closes between the 2 spines mentioned above.

Second gnathopod in male strongly subchelate, considerably larger than the 1st pair, front margin of 2nd joint produced in front and a little downward as a thin lobe, 3rd not lobed, 4th joint obtusely produced below, hind margin of 5th joint narrowly produced between 4th and 6th, its fringed end extending to or a little beyond the distal end of 4th joint but in some cases scarcely reaches to it; 6th joint large, oblong oval, front margin smooth, evenly convex, twice as long as hind margin which is provided with a bundle of short setules near the obtuse defining angle, palm rather strongly oblique, convex, setulose, finger much curved, as long as palm, the apex fitting to a small pocket on the inner surface of defining angle which is accompanied by 2 short spines.

First and 2nd gnathopods in female subchelate, less massive than in male, and nearly of the same structure to those in male, except that the front margin of 2nd joint of the 1st gnathopod in female is produced in front as a thin lamella as is the case in the 2nd gnathopod in male, and the 2nd joint is gradually widened distally, not abruptly to the middle as in male, and the hind margin of propodus of 2nd gnathopod in female is slightly elevated near the middle upon which is found a row of setules which are larger in number than in male.

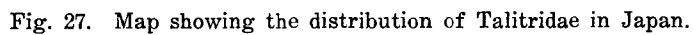
First and 2nd pereopods slender, 3rd to 5th more robust, and the 2nd joints in the last 3 pairs is largely expanded behind and below beyond the distal ends of 3rd joints, and 4th and 5th joints in these 3 pairs of pereopods are dilated distally, while the 6th joints are elongate. Fingers of all the pereopods are provided each with a prominent seta on inner margin near the base of nail. Peduncle of pleopod about half as long as rami, provided near the distal end with 3 or 4 retinacula with hooked ends; rami 14–15-jointed. Four or 5 setules with bifurcated ends (Fig. 22, c) are found on the basal joint of inner ramus instead of the hooked setules found in *Allorchestes malleolus*.

Rami of uropods are somewhat shorter than peduncle in the 1st pair, but are subequal to peduncle in the 2nd and 3rd pairs, and armed with both marginal and apical spines in the 1st and 2nd uropods, while in the 3rd it is surmounted by apical spines only. The telson is cleft to the base, the lobes are triangular in shape, with a few setules near apex, and are widely divergent.

Remarks. The species is distinguished from *Allorchestes malleolus* and its subspecies *carinatus* in the closely approximated eyes, the long plumose 2nd antennae with flagellum about twice as long as peduncle, and in the possession of marginal spines on the outer ramus of 1st and 2nd uropods which are absent in the *malleolus* and *malleolus carinatus*, and in that the telson is divided to base which in the latter two forms the cleft not reaching to the middle.

According to the description given by Chevreux the Mediterranean form is somewhat different from the Japanese specimens in the 2nd antennae and in the 2nd gnathopod of female. In the Mediterranean specimens the ultimate and penultimate joints of peduncle and the proximal 10 joints are each provided with a fascicle of setules on lower margin, while in those from Japan only the ultimate joint of peduncle and first 6–7 joints are provided with them. The 6th joint of 2nd gnathopod in the female of Mediterranean form is almost quadrangular in shape and the hind margin is slightly concave and unarmed, in the Japanese specimens, however, the joint is oblong oval, the hind margin is evenly convex, and is provided with a low setulose tubercle near the middle.

The specimens examined came from Akkesi, Esasi, Masike and Muroran in Hokkaido, Simoda, Central Japan, and from Keelung, Formosa. The amphipods are marine in habitat. At Akkesi they are living among dead shells of oysters or on the muddy bottom of the sea and are colored light yellow with black eyes, while in Simoda they are found among algae between tide-marks and are olive-green in colour.



- | | | |
|---------------------------------------|--------------------------------|---|
| ○ <i>Orchestia platensis</i> | ⊙ <i>Orchestia solifuga</i> | ▣ <i>Hyale gracilis</i> |
| ● <i>Orchestia platensis japonica</i> | ⌘ <i>Talorchestia brito</i> | ⚡ <i>Parhyale kurilensis</i> |
| ◐ <i>Orchestia ditmari</i> | □ <i>Hyale novaezealandiae</i> | △ <i>Allorchestes malleolus</i> |
| ⦿ <i>Orchestia kokuboi</i> | ■ <i>Hyale schmidtii</i> | ▲ <i>Allorchestes malleolus carinatus</i> |
| ⊕ <i>Orchestia tenuimana</i> | ⊠ <i>Hyale Dollfusi</i> | ▲ <i>Allorchestes plumicornis</i> |

The Talitridae of Japan includes, as mentioned above, marine, brackish water, fresh-water, and terrestrial forms. Marine inhabitants are the predominating, including *Orchestia platensis*, *O. platensis japonica*, *O. ditmari*, *O. tenuimana*, *Talorchestia brito*, *Allorchestes malleolus*, *All. malleolus carinatus*, *All. plumicornis*, *Hyale novaezealandiae*, *H. schmidtii*, *H. Dollfusi*, *H. gracilis* and *Parhyale kurilensis*, and most of them are found between the tide-marks. *Orchestia kokuboi* and *O. solifuga* are purely terrestrial in habitat, while *O. platensis japonica* is maricolous, limicolous or sometimes terricolous.

The geographical distribution in Japan of the forms treated in the preceding pages is shown in the accompanying map and in Table I.

TABLE I

Species	Locality	Kuril Is.	Sakhalin	Hokkaido	Japan Proper	Kyūshū	Korea	Formosa
<i>Orchestia platensis</i>				○	○			○
<i>Orchestia platensis japonica</i>				○	○	○		
<i>Orchestia ditmari</i>		○	○	○				
<i>Orchestia kokuboi</i>				○	○			
<i>Orchestia tenuimana</i>				○				
<i>Orchestia solifuga</i>				○				
<i>Talorchestia brito</i>				○				
<i>Hyale novaezealandiae</i>				○		○		
<i>Hyale schmidtii</i>				○			○	○
<i>Hyale Dollfusi</i>				○		○		
<i>Hyale gracilis</i>						○		○
<i>Parhyale kurilensis</i>		○		○				
<i>Allorchestes malleolus</i>				○				
<i>Allorchestes malleolus carinatus</i>		○						
<i>Allorchestes plumicornis</i>				○	○			
No. of spp. and subspp.		3	1	13	4	4	1	3

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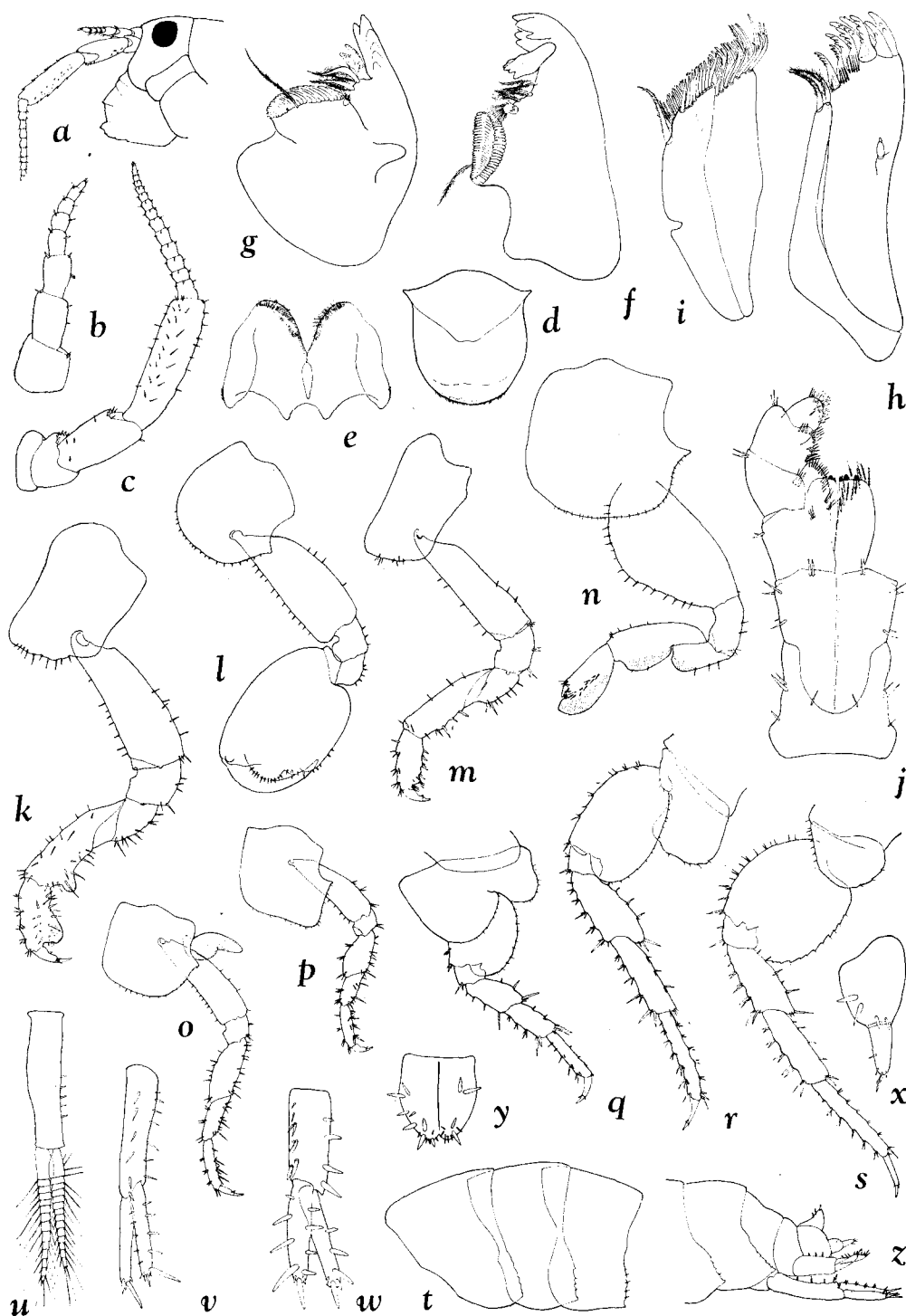
PLATE IX

Explanation of Plate IX

Orchestia platensis KRØYER from Birō.

All the figures were drawn from the male, except Figs. m, n and z, which were from the female.

- Fig. a. Head and antennate in side view, $\times 11$.
- Fig. b. Right first antenna, dorsal view, $\times 22$.
- Fig. c. Left second antenna, outer view, $\times 14$.
- Fig. d. Upper lip, $\times 36$.
- Fig. e. Lower lip, $\times 36$.
- Fig. f. Left mandible, $\times 53$.
- Fig. g. Right mandible, $\times 53$.
- Fig. h. First maxilla, $\times 72$.
- Fig. i. Second maxilla, $\times 72$.
- Fig. j. Maxilliped, $\times 45$.
- Fig. k. First gnathopod in male, $\times 18$.
- Fig. l. Second gnathopod in male, $\times 14$.
- Fig. m. First gnathopod in female, $\times 18$.
- Fig. n. Second gnathopod in female, $\times 18$.
- Fig. o. First pereopod, $\times 11$.
- Fig. p. Second pereopod, $\times 11$.
- Fig. q. Third pereopod, $\times 11$.
- Fig. r. Fourth pereopod, $\times 11$.
- Fig. s. Fifth pereopod, $\times 11$.
- Fig. t. First to third pleon segments in side view, $\times 11$.
- Fig. u. Third pleopod, $\times 18$.
- Fig. v. Left first uropod, dorsal view, $\times 14$.
- Fig. w. Right second uropod, dorsal view, $\times 22$.
- Fig. x. Left third uropod, ventral view, $\times 36$.
- Fig. y. Telson, dorsal view, $\times 22$.
- Fig. z. Urosome segments in side-view, $\times 5$.



M. Iwasa del.

Orchestia platensis KRØYER

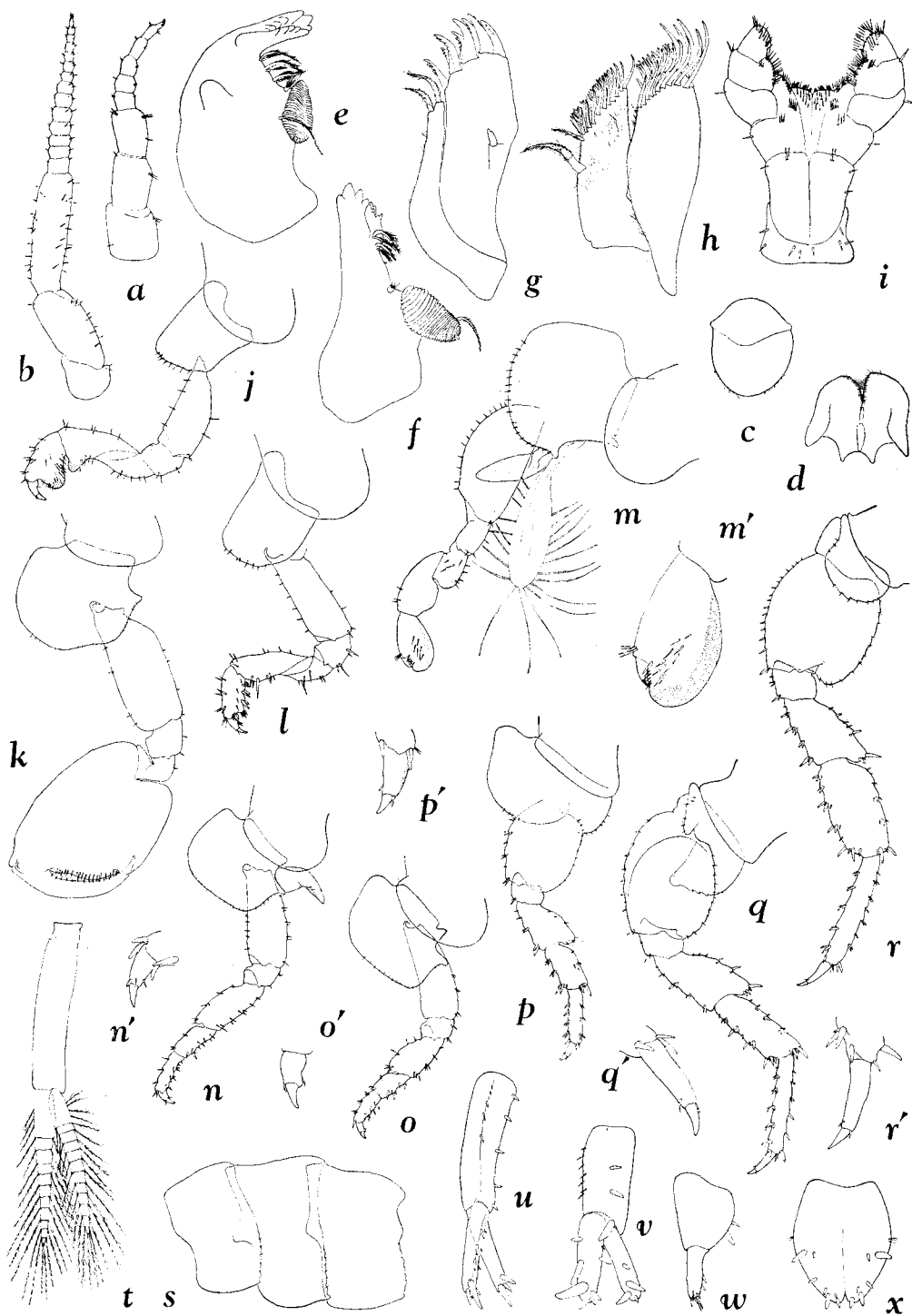
M. Iwasa : Japanese Talitridae

Explanation of Plate X

Orchestia platensis japonica (TATTERSALL) from Osyoro.

All the figures were drawn from the male, except Figs, l, m and m', which were from female.

- Fig. a. Right first antenna, dorsal view, $\times 22$.
- Fig. b. Second antenna, $\times 11$.
- Fig. c. Upper lip, $\times 27$.
- Fig. d. Lower lip, $\times 27$.
- Fig. e. Left mandible, $\times 53$.
- Fig. f. Right mandible, $\times 53$.
- Fig. g. First maxilla, $\times 72$.
- Fig. h. Second maxilla, $\times 81$.
- Fig. i. Maxilliped, $\times 36$.
- Fig. j. First gnathopod in male, $\times 14$.
- Fig. k. Second gnathopod in male, $\times 14$.
- Fig. l. First gnathopod in female, $\times 18$.
- Fig. m. Second gnathopod in female, $\times 18$.
- Fig. m'. Propodus and dactylus of the same, further enlarged, $\times 45$.
- Fig. n. First pereopod, $\times 11$.
- Fig. n'. Finger of the same, further enlarged, $\times 36$.
- Fig. o. Second pereopod, $\times 11$.
- Fig. o'. Finger of the same, further enlarged, $\times 36$.
- Fig. p. Third pereopod, $\times 11$.
- Fig. p'. Finger of the same, further enlarged, $\times 36$.
- Fig. q. Fourth pereopod, $\times 11$.
- Fig. q'. Finger of the same, further enlarged, $\times 36$.
- Fig. r. Fifth pereopod, $\times 11$.
- Fig. r'. Finger of the same, further enlarged, $\times 27$.
- Fig. s. First to third pleon segments in side view, $\times 11$.
- Fig. t. Second pleopod, $\times 22$.
- Fig. u. Right first uropod, dorsal view, $\times 18$.
- Fig. v. Right second uropod, dorsal view, $\times 22$.
- Fig. w. Third uropod, $\times 36$.
- Fig. x. Telson, dorsal view, $\times 36$.



M. Iwasa del.

Orchestia platensis japonica (TATTERSALL)

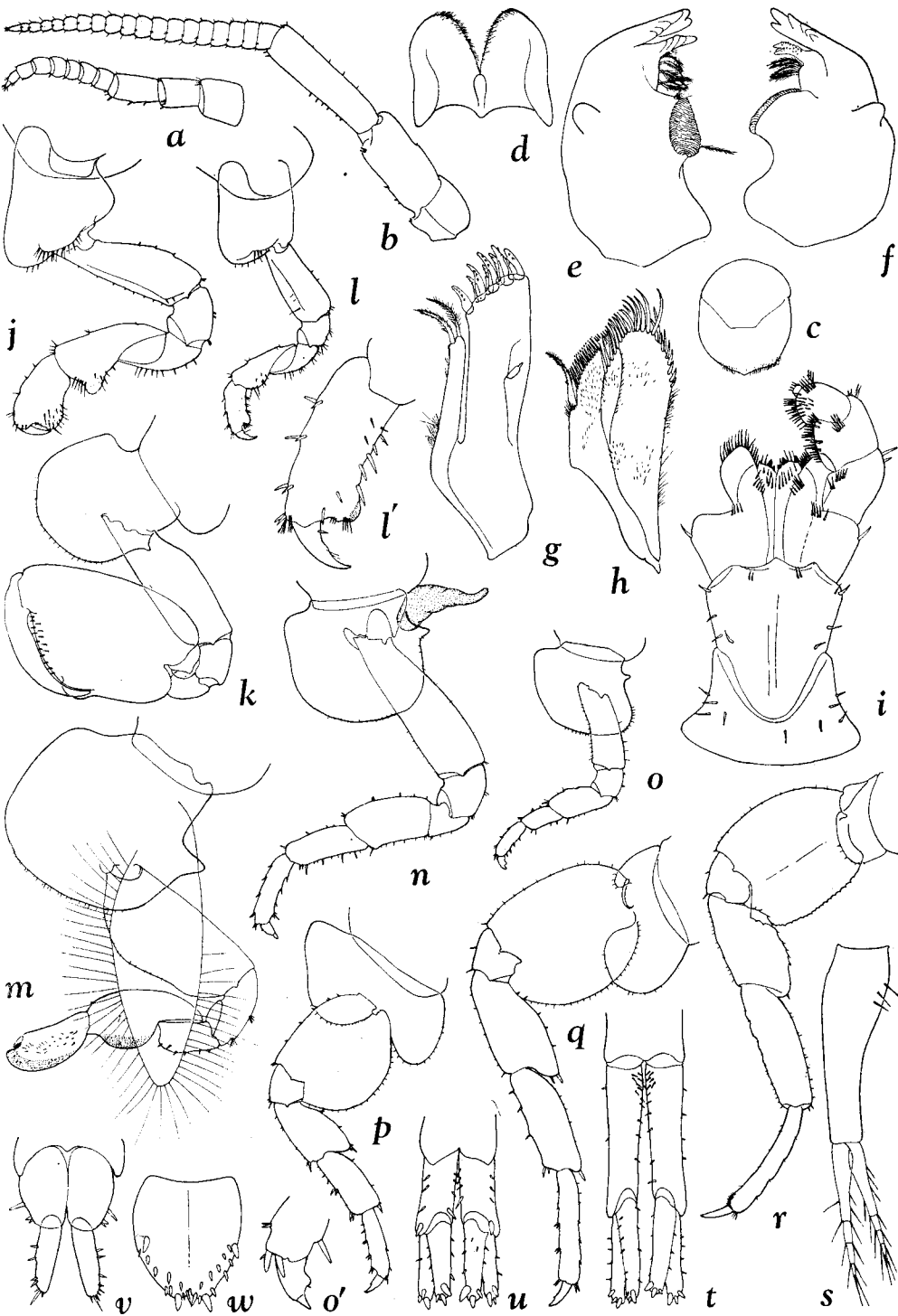
M. Iwasa : Japanese Talitridae

Explanation of Plate XI

Orchestia ditmari DERSHAVIN from Akkesi.

All the figures were drawn from male, except Figs. l, l' and m, which were from female.

- Fig. a. Left first antenna, dorsal view.
- Fig. b. Left second antenna, outer view.
- Fig. c. Upper lip.
- Fig. d. Lower lip.
- Fig. e. Left mandible.
- Fig. f. Right mandible.
- Fig. g. First maxilla.
- Fig. h. Second maxilla.
- Fig. i. Maxilliped.
- Fig. j. First gnathopod in male.
- Fig. k. Second gnathopod in male.
- Fig. l. First gnathopod in female.
- Fig. l'. Propodus and dactylus of the same, further enlarged.
- Fig. m. Second gnathopod in female.
- Fig. n. First pereopod.
- Fig. o. Second pereopod.
- Fig. o'. Finger of the same, further enlarged.
- Fig. p. Third pereopod.
- Fig. q. Fourth pereopod.
- Fig. r. Fifth pereopod.
- Fig. s. Left first pleopod.
- Fig. t. First uropods, dorsal view.
- Fig. u. Second uropods, dorsal view.
- Fig. v. Third uropods, dorsal view.
- Fig. w. Telson, dorsal view.



M. Iwasa del

Orchestia ditmari DERSHAVIN

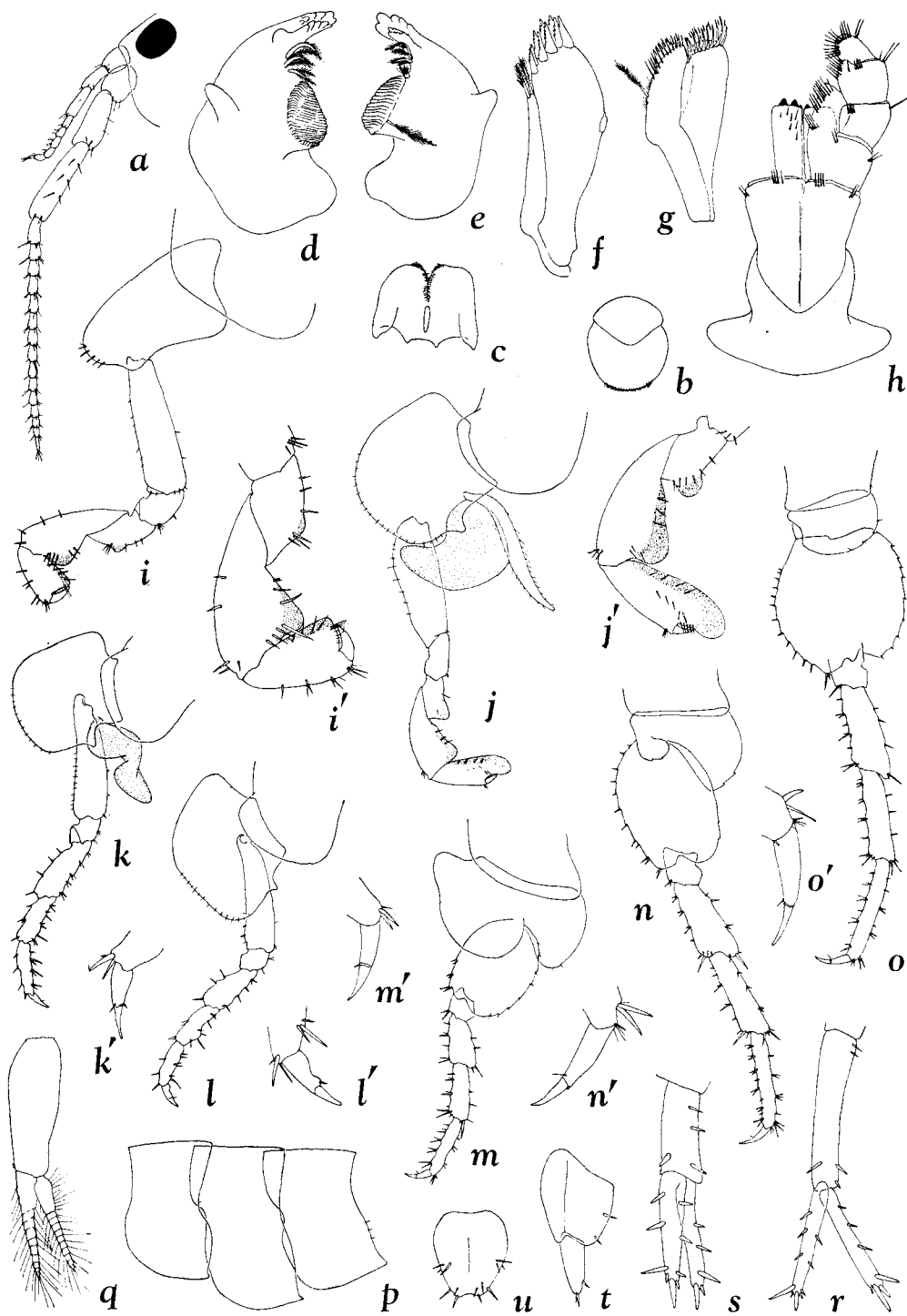
M. Iwasa : Japanese Talitridae

Explanation of Plate XII

Orchestia kokuboi UÉNO from Mt. Harukayama.

All the figures were drawn from the female.

- Fig. a. First and second antennae in side view, $\times 14$.
- Fig. b. Upper lip, $\times 23$.
- Fig. c. Lower lip, $\times 23$.
- Fig. d. Left mandible, $\times 45$.
- Fig. e. Right mandible, $\times 45$.
- Fig. f. First maxilla, $\times 57$.
- Fig. g. Second maxilla, $\times 57$.
- Fig. h. Maxilliped, $\times 45$.
- Fig. i. First gnathopod in female, $\times 20$.
- Fig. i'. Distal joints of the same, further enlarged, $\times 34$.
- Fig. j. Second gnathopod in female, $\times 14$.
- Fig. j'. Distal joints of the same, further enlarged, $\times 34$.
- Fig. k. First pereopod, $\times 11$.
- Fig. k'. Finger of the same, further enlarged.
- Fig. l. Second pereopod, $\times 11$.
- Fig. l'. Finger of the same, further enlarged, $\times 34$.
- Fig. m. Third pereopod, $\times 11$.
- Fig. m'. Finger of the same, further enlarged.
- Fig. n. Fourth pereopod, $\times 11$.
- Fig. n'. Finger of the same, further enlarged, $\times 34$.
- Fig. o. Fifth pereopod, $\times 11$.
- Fig. o'. Finger of the same, further enlarged, $\times 34$.
- Fig. p. First to third pleon segments in side view, $\times 11$.
- Fig. q. Second pleopod, $\times 34$.
- Fig. r. Right first uropod, dorsal view, $\times 17$.
- Fig. s. Right second uropod, dorsal view, $\times 23$.
- Fig. t. Third uropod, $\times 34$.
- Fig. u. Telson, dorsal view, $\times 23$.



M. Iwasa del.

Orchestia kokuboi UENO

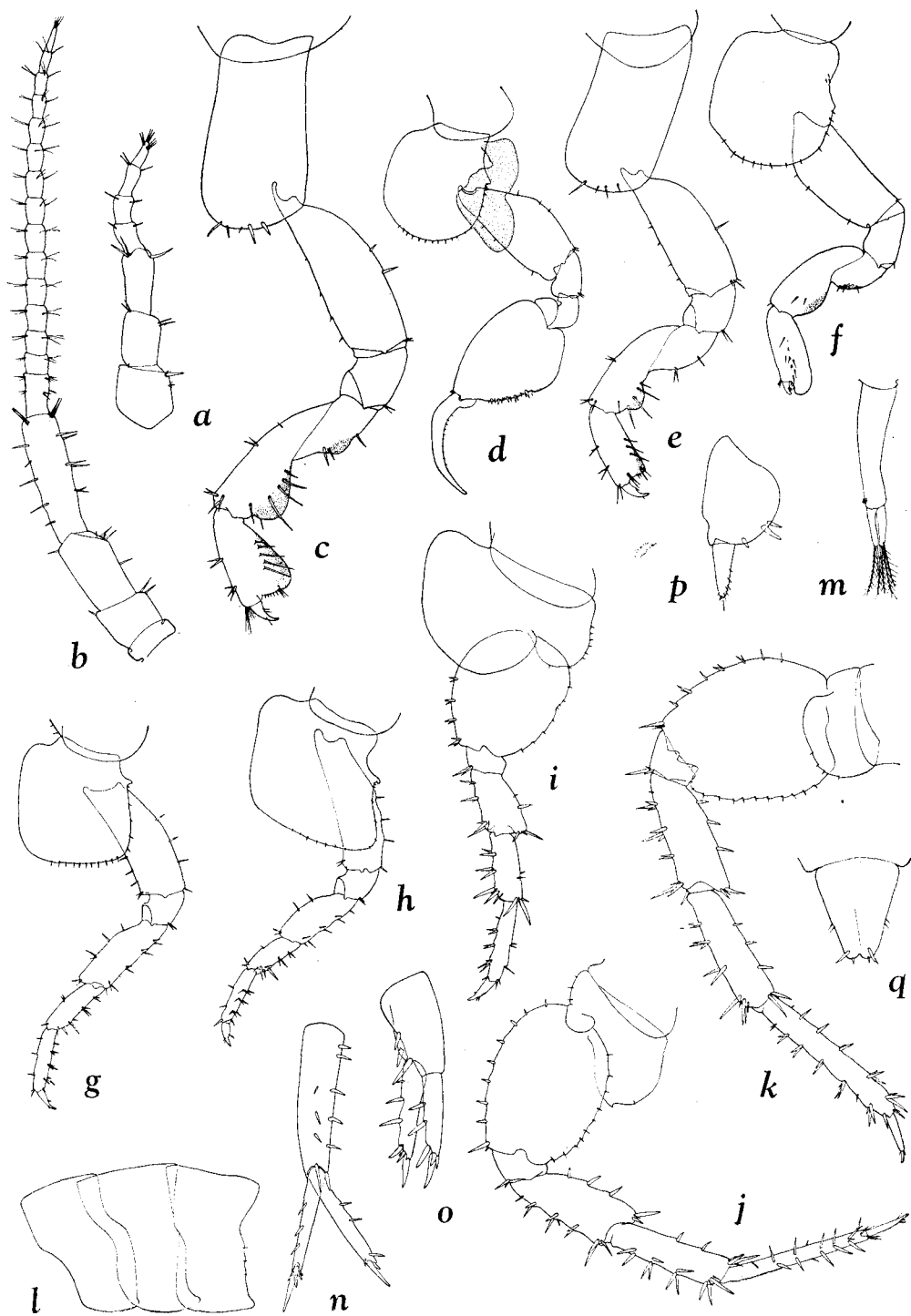
M. Iwasa : Japanese Talitridae

Explanation of Plate XIII

Orchestia tenuimana, n. sp. from Suttu.

All the figures were drawn from male, except Figs. e and f, which were from female.

- Fig. a. Right first antenna, dorsal view, $\times 36$.
- Fig. b. Right second antenna, dorsal view, $\times 22$.
- Fig. c. First gnathopod in male, $\times 36$.
- Fig. d. Second gnathopod in male, $\times 18$.
- Fig. e. First gnathopod in female, $\times 36$.
- Fig. f. Second gnathopod in female, $\times 27$.
- Fig. g. First pereopod, $\times 18$.
- Fig. h. Second pereopod, $\times 18$.
- Fig. i. Third pereopod, $\times 18$.
- Fig. j. Fourth pereopod, $\times 18$.
- Fig. k. Fifth pereopod, $\times 18$.
- Fig. l. First to third pleon segments in side view, $\times 14$.
- Fig. m. Second pleopod, $\times 36$.
- Fig. n. Right first uropod, dorsal view, $\times 22$.
- Fig. o. Right second uropod, outer view, $\times 27$.
- Fig. p. Third uropod, $\times 36$.
- Fig. q. Telson, dorsal view, $\times 36$.



M. Iwasa del.

Orchestia tenuimana, n. sp.

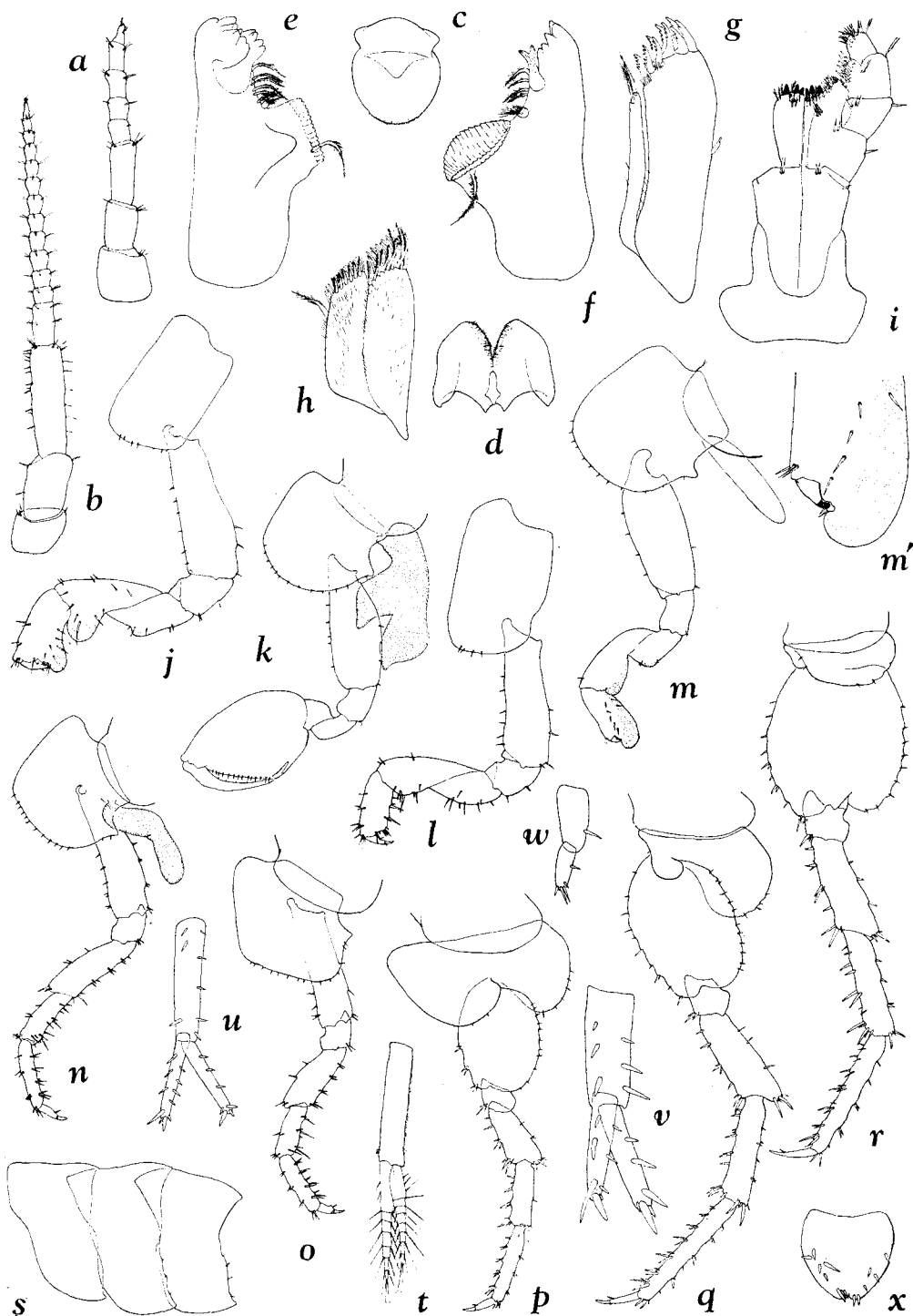
M. Iwasa : Japanese Talitridae

Explanation of Plate XIV

Orchestia solifuga, n. sp. from Akkesi.

All the figures were drawn from the male, except Figs. c, l, m, m' and w, which were from female.

- Fig. a. Right first antenna, dorsal view, $\times 36$.
- Fig. b. Left second antenna, outer view, $\times 22$.
- Fig. c. Upper lip, $\times 36$.
- Fig. d. Lower lip, $\times 36$.
- Fig. e. Left mandible, $\times 72$.
- Fig. f. Right mandible, $\times 72$.
- Fig. g. First maxilla, $\times 81$.
- Fig. h. Second maxilla, $\times 81$.
- Fig. i. Maxilliped, $\times 53$.
- Fig. j. First gnathopod in male, $\times 27$.
- Fig. k. Second gnathopod in male, $\times 18$.
- Fig. l. First gnathopod in female, $\times 27$.
- Fig. m. Second gnathopod in female, $\times 22$.
- Fig. m'. Distal end of the same, further enlarged, $\times 81$.
- Fig. n. First pereopod, $\times 18$.
- Fig. o. Second pereopod, $\times 18$.
- Fig. p. Third pereopod, $\times 18$.
- Fig. q. Fourth pereopod, $\times 18$.
- Fig. r. Fifth pereopod, $\times 18$.
- Fig. s. First to third pleon segments in side view, $\times 14$.
- Fig. t. Third uropod, $\times 22$.
- Fig. u. Right first uropod, dorsal view, $\times 18$.
- Fig. v. Right second uropod, dorsal view, $\times 36$.
- Fig. w. Third uropod, $\times 36$.
- Fig. x. Telson, dorsal view, $\times 36$.



M. Iwasa del.

Orchestia solifuga, n. sp.

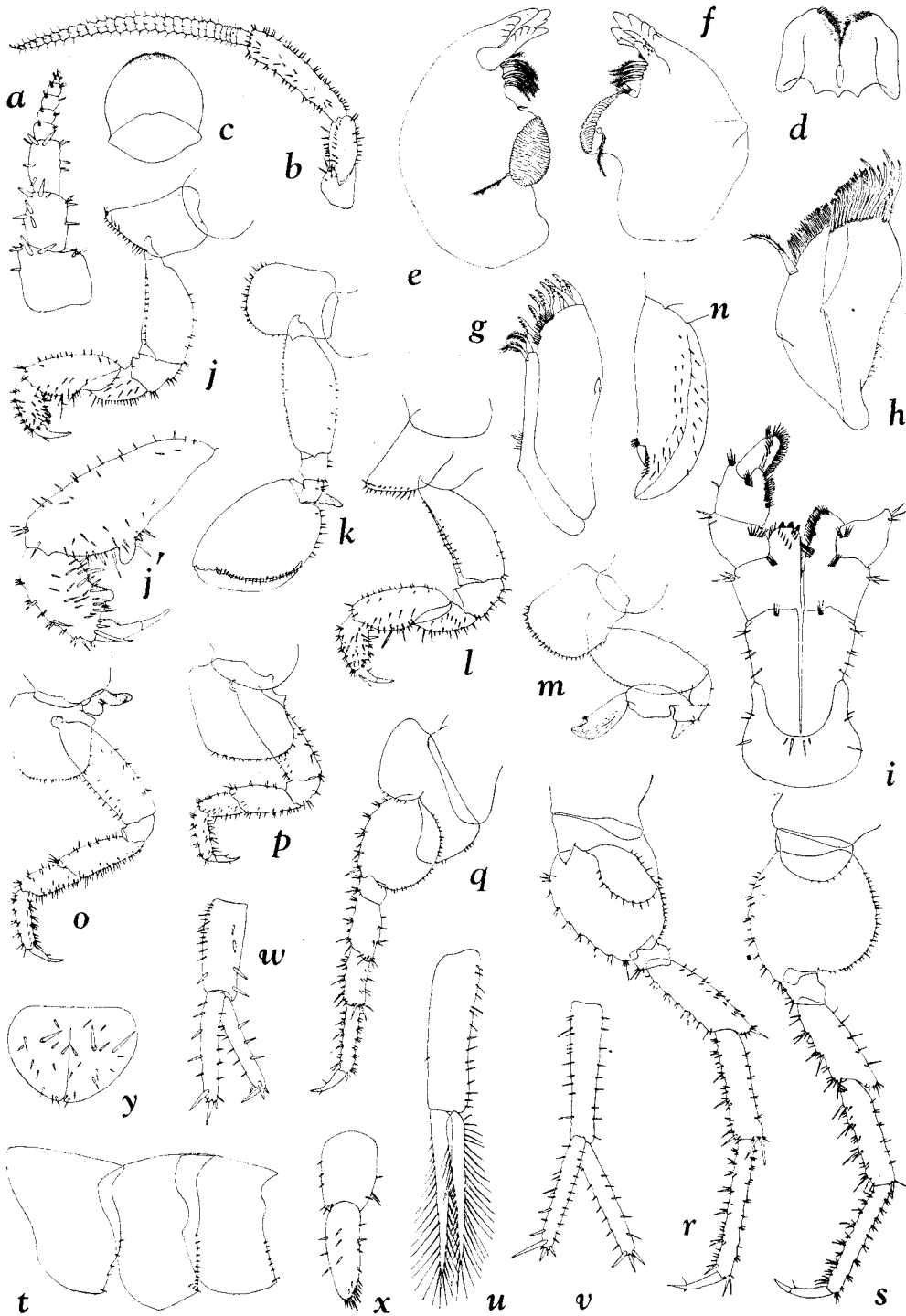
M. Iwasa: Japanese Talitridae

Explanation of Plate XV

Talorchestia brito STEBBING from Tomakomai.

All the figures were drawn from male, except l, m and n, which were from female.

- Fig. a. Right first antenna, dorsal view, $\times 22$.
- Fig. b. Right second antenna, inner view, $\times 5$.
- Fig. c. Upper lip, $\times 18$.
- Fig. d. Lower lip, $\times 18$.
- Fig. e. Left mandible, $\times 36$.
- Fig. f. Right mandible, $\times 36$.
- Fig. g. First maxilla, $\times 36$.
- Fig. h. Second maxilla, $\times 45$.
- Fig. i. Maxilliped, $\times 27$.
- Fig. j. First gnathopod in male, $\times 5$.
- Fig. j'. Distal joints of the same, further enlarged, $\times 18$.
- Fig. k. Second gnathopod in male, $\times 5$.
- Fig. l. First gnathopod in female, $\times 5$.
- Fig. m. Second gnathopod in female, $\times 5$.
- Fig. n. Distal joints of the same, further enlarged, $\times 27$.
- Fig. o. First pereopod, $\times 5$.
- Fig. p. Second pereopod, $\times 5$.
- Fig. q. Third pereopod, $\times 5$.
- Fig. r. Fourth pereopod, $\times 5$.
- Fig. s. Fifth pereopod, $\times 5$.
- Fig. t. First to third pleon segments in side view.
- Fig. u. Third pleopod, $\times 114$.
- Fig. v. First uropod, $\times 11$.
- Fig. w. Second uropod, $\times 14$.
- Fig. x. Third uropod, $\times 22$.
- Fig. y. Telson, dorsal view, $\times 22$.



M. Iwasa del.

Talorchestia brito STEBBING

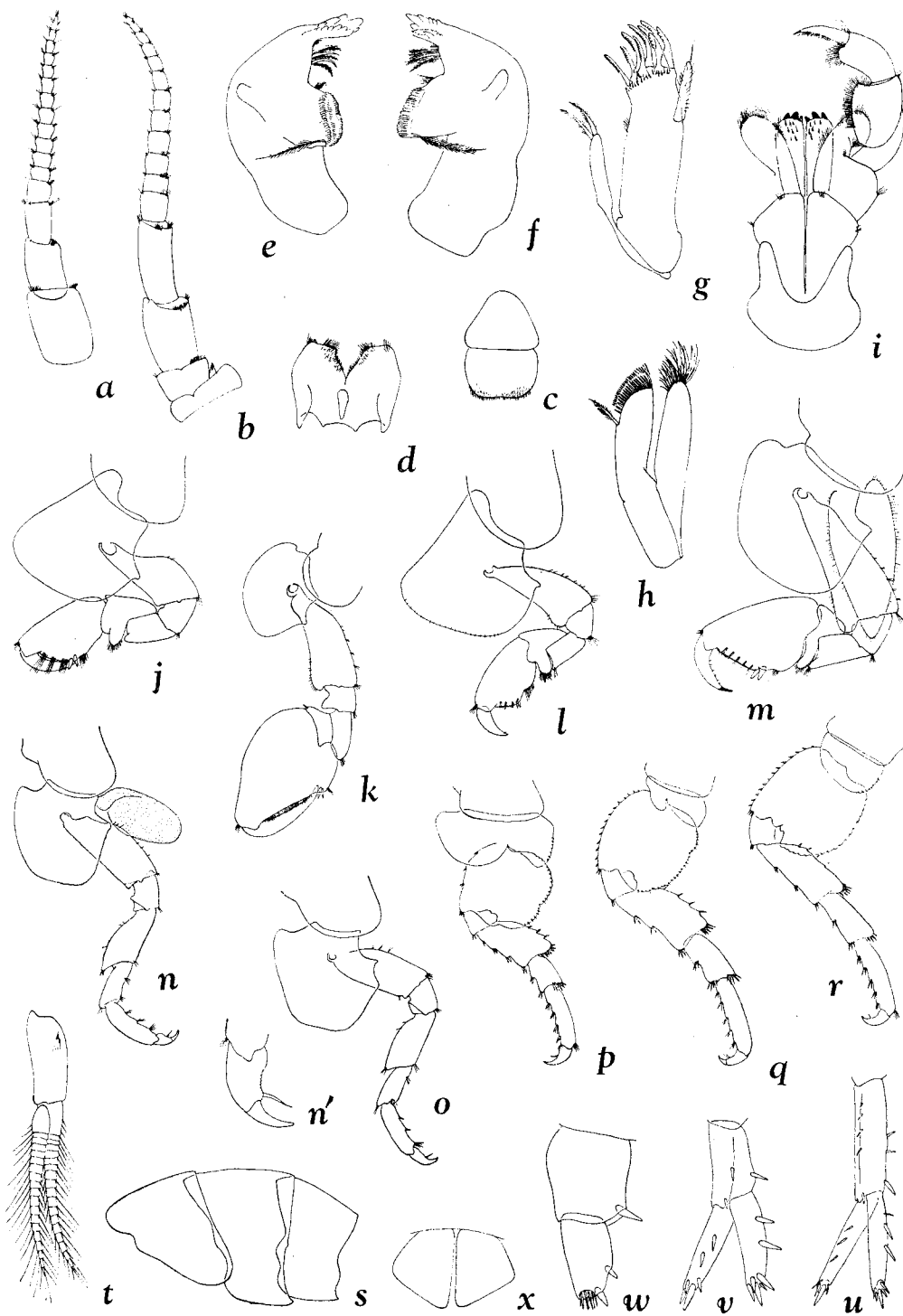
M. Iwasa : Japanese Talitridae

Explanation of Plate XVI

Hyale novaezealandiae THOMSON from Muroran.

All the figures were drawn from male, except l, m and t, which were from female.

- Fig. a. Right first antenna, dorsal view, $\times 14$.
- Fig. b. Right second antenna, dorsal view, $\times 11$.
- Fig. c. Upper lip, $\times 17$.
- Fig. d. Lower lip, $\times 17$.
- Fig. e. Left mandible, $\times 34$.
- Fig. f. Right mandible, $\times 34$.
- Fig. g. First maxilla, $\times 34$.
- Fig. h. Second maxilla, $\times 34$.
- Fig. i. Maxilliped, $\times 23$.
- Fig. j. First gnathopod in male, $\times 11$.
- Fig. k. Second gnathopod in male, $\times 7$.
- Fig. l. First gnathopod in female, $\times 14$.
- Fig. m. Second gnathopod in female, $\times 14$.
- Fig. n. First pereopod, $\times 7$.
- Fig. n'. Finger of the same, further enlarged, $\times 23$.
- Fig. o. Second pereopod, $\times 7$.
- Fig. p. Third pereopod, $\times 7$.
- Fig. q. Fourth pereopod, $\times 7$.
- Fig. r. Fifth pereopod, $\times 7$.
- Fig. s. First to third pleon segments in side view, $\times 7$.
- Fig. t. Third pleopod in female, $\times 14$.
- Fig. u. Left first uropod, dorsal view, $\times 14$.
- Fig. v. Left second uropod, dorsal view, $\times 17$.
- Fig. w. Third uropod, $\times 34$.
- Fig. x. Telson, dorsal view, $\times 23$.



M. Iwasa del.

Hyale novaezealandiae THOMSON

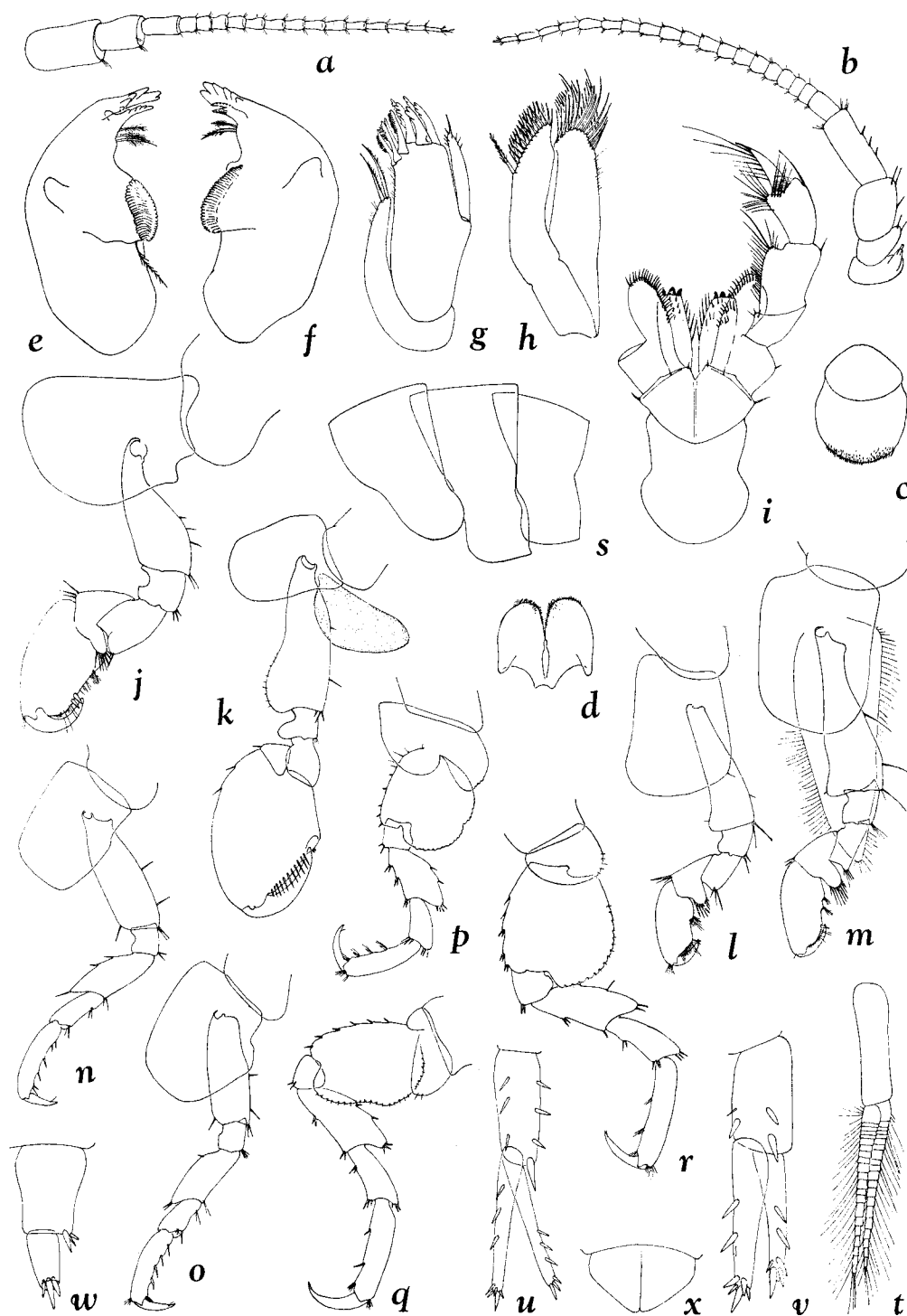
M. Iwasa: Japanese Talitridae

Explanation of Plate XVII

Hyale schmidtii (HELLER) from Osyoro.

All the figures were drawn from male, except Figs. l and m, which were from female.

- Fig. a. Left first antenna, dorsal view, $\times 23$.
- Fig. b. Left second antenna, inner view, $\times 23$.
- Fig. c. Upper lip, $\times 34$.
- Fig. d. Lower lip, $\times 23$.
- Fig. e. Left mandible, $\times 57$.
- Fig. f. Right mandible, $\times 57$.
- Fig. g. First maxilla, $\times 57$.
- Fig. h. Second maxilla, $\times 67$.
- Fig. i. Maxilliped, $\times 34$.
- Fig. j. First gnathopod in male, $\times 23$.
- Fig. k. Second gnathopod in male, $\times 14$.
- Fig. l. First gnathopod in female, $\times 23$.
- Fig. m. Second gnathopod in female, $\times 23$.
- Fig. n. First pereopod, $\times 14$.
- Fig. o. Second pereopod, $\times 14$.
- Fig. p. Third pereopod, $\times 14$.
- Fig. q. Fourth pereopod, $\times 14$.
- Fig. r. Fifth pereopod, $\times 14$.
- Fig. s. First to third pleon segments in side view, $\times 14$.
- Fig. t. First pleopod, $\times 17$.
- Fig. u. Right first uropod, dorsal view, $\times 23$.
- Fig. v. Right second uropod, dorsal view, $\times 34$.
- Fig. w. Right third uropod, dorsal view, $\times 45$.
- Fig. x. Telson, dorsal view, $\times 11$.



M. Iwasa del.

Hyale schmidti (HELLER)

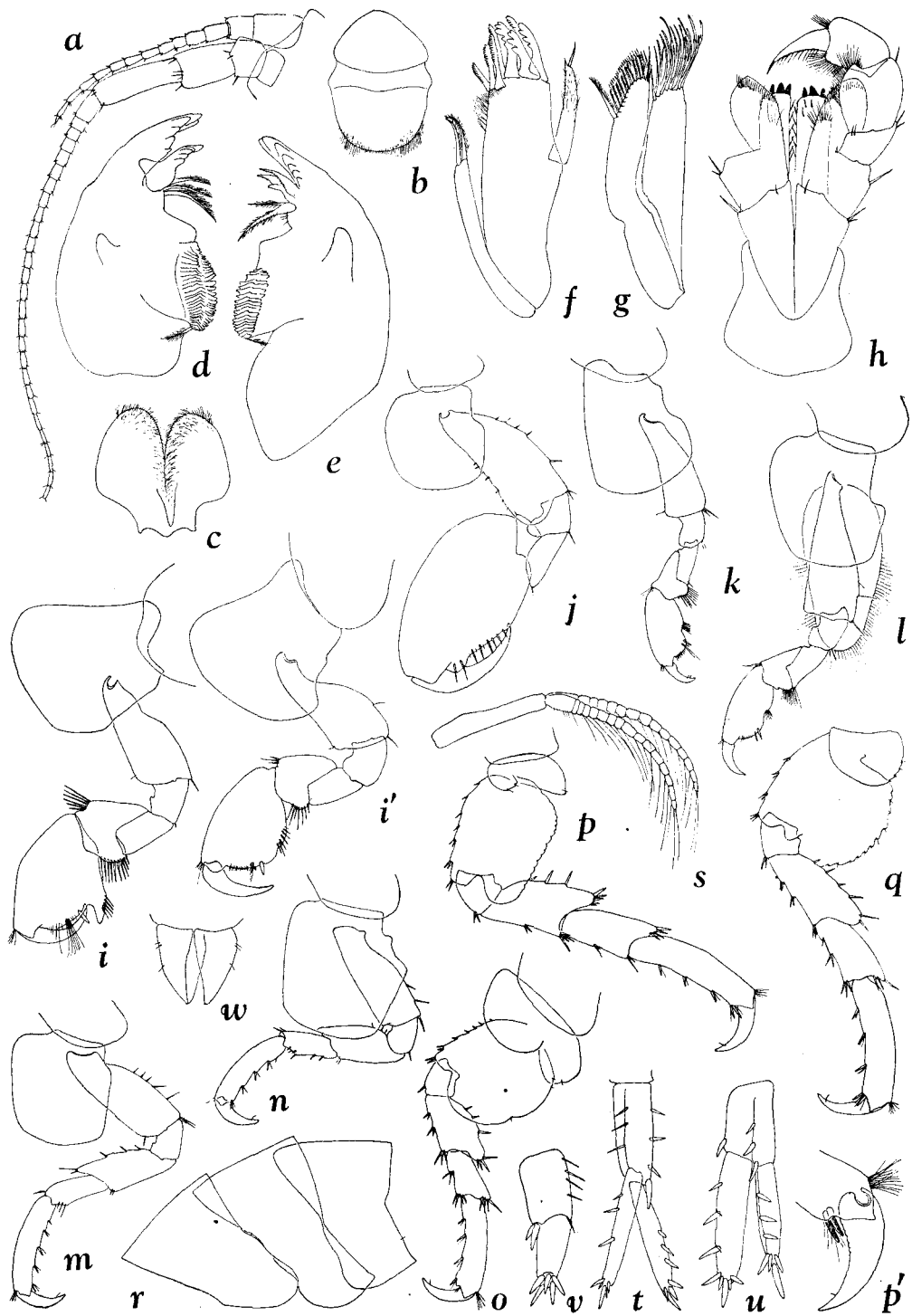
M. Iwasa : Japanese Talitridae

Explanation of Plate XVIII

Hyale Dollfusi CHEVREUX from Kosiki-zima.

All the figures were drawn from male, except Figs. k and l, which were from female.

- Fig. a. First and second antennae in side view, $\times 23$.
- Fig. b. Upper lip, $\times 57$.
- Fig. c. Lower lip, $\times 57$.
- Fig. d. Left mandible, $\times 102$.
- Fig. e. Right mandible, $\times 102$.
- Fig. f. First maxilla, $\times 90$.
- Fig. g. Second maxilla, $\times 174$.
- Fig. h. Maxilliped, $\times 174$.
- Fig. i. First gnathopod in male, $\times 34$.
- Fig. i'. The same from another individual, $\times 45$.
- Fig. j. Second gnathopod in male, $\times 23$.
- Fig. k. First gnathopod in female, $\times 34$.
- Fig. l. Second gnathopod in female, $\times 34$.
- Fig. m. First pereopod, $\times 23$.
- Fig. n. Second pereopod, $\times 23$.
- Fig. o. Third pereopod, $\times 23$.
- Fig. p. Fourth pereopod, $\times 23$.
- Fig. p'. Finger and the obliquely striated spines of the same, further enlarged $\times 45$.
- Fig. q. Fifth pereopod, $\times 23$.
- Fig. r. First to third pleon segments in side view, $\times 23$.
- Fig. s. First pleopod, $\times 34$.
- Fig. t. Right first uropod, dorsal view, $\times 45$.
- Fig. u. Right second uropod, dorsal view, $\times 45$.
- Fig. v. Left third uropod, dorsal view, $\times 57$.
- Fig. w. Telson, dorsal view. $\times 57$.



M. Iwasa del.

Hyale Dollfusi CHEVREUX

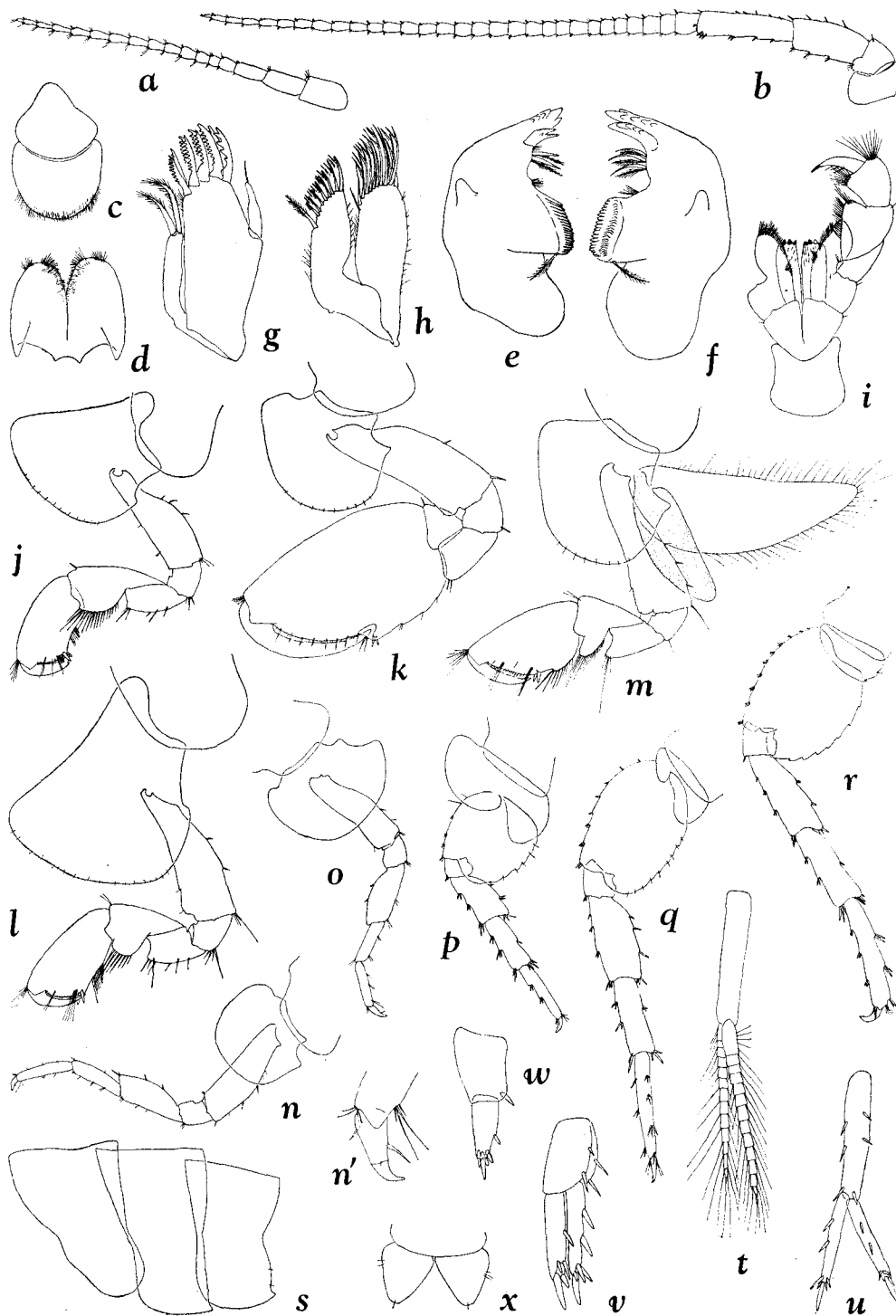
M. Iwasa : Japanese Talitridae

Explanation of Plate XIX

Hyale gracilis, n. sp. from Botel Tobago.

All the figures were drawn from male, except Figs. l and m, which were from female.

- Fig. a. Right first antenna, dorsal view, $\times 23$.
- Fig. b. Left second antenna, outer view, $\times 23$.
- Fig. c. Upper lip, $\times 57$.
- Fig. d. Lower lip, $\times 57$.
- Fig. e. Right mandible, $\times 102$.
- Fig. f. Left mandible, $\times 102$.
- Fig. g. First maxilla, $\times 102$.
- Fig. h. Second maxilla, $\times 102$.
- Fig. i. Maxilliped, $\times 45$.
- Fig. j. First gnathopod in male, $\times 34$.
- Fig. k. Second gnathopod in male, $\times 34$.
- Fig. l. First gnathopod in female, $\times 57$.
- Fig. m. Second gnathopod in female, $\times 45$.
- Fig. n. First pereopod, $\times 23$.
- Fig. n'. Finger of the same, further enlarged, $\times 102$.
- Fig. o. Second pereopod, $\times 23$.
- Fig. p. Third pereopod, $\times 23$.
- Fig. q. Fourth pereopod, $\times 23$.
- Fig. r. Fifth pereopod, $\times 23$.
- Fig. s. First to third pleon segments in side view, $\times 23$.
- Fig. t. Pleopod, $\times 34$.
- Fig. u. Right first uropod, dorsal view, $\times 34$.
- Fig. v. Right second uropod, dorsal view, $\times 45$.
- Fig. w. Third uropod, $\times 67$.
- Fig. x. Telson, dorsal view, $\times 57$.



M. Iwasa del.

Hyale gracilis, n. sp.

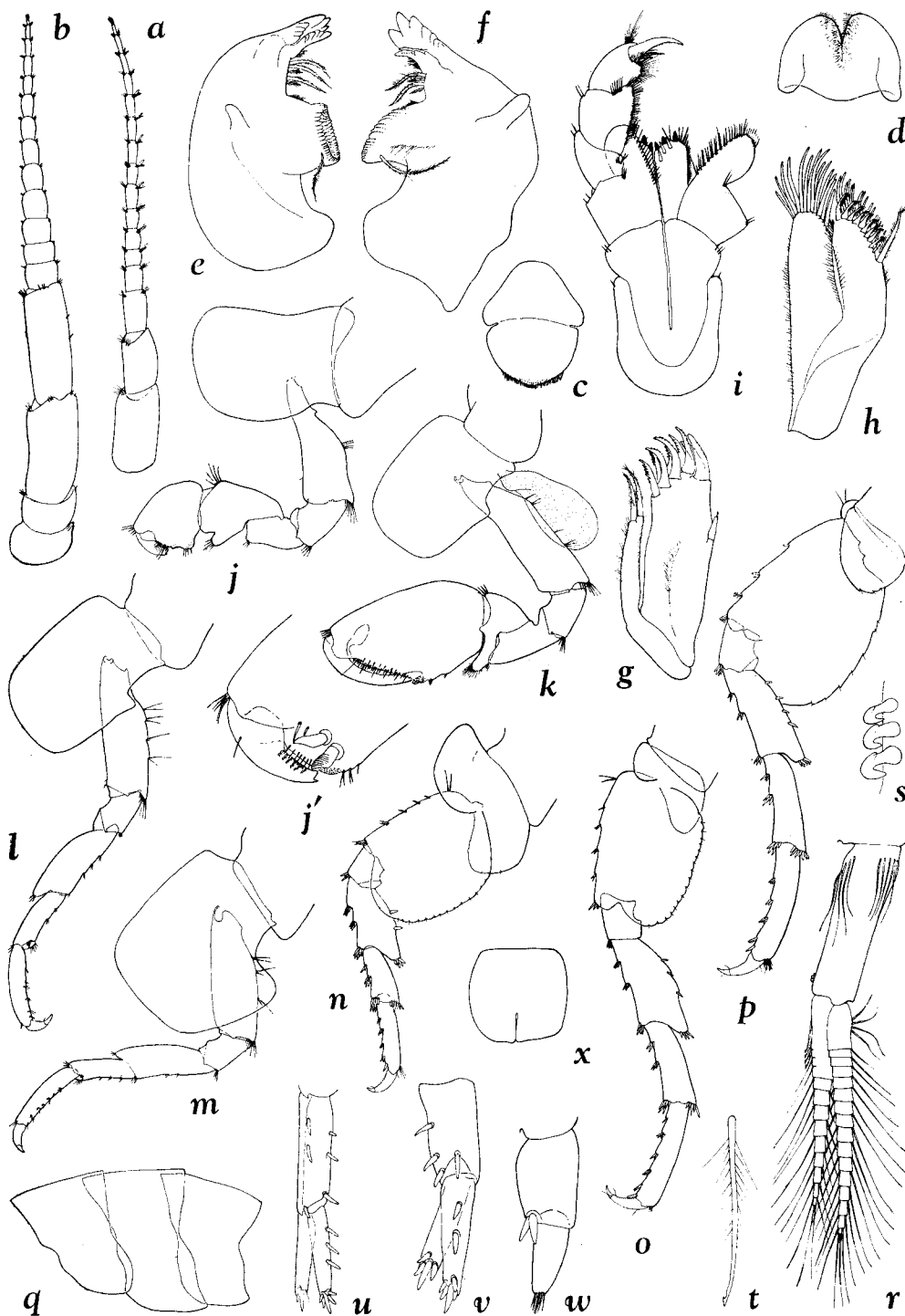
M. Iwasa : Japanese Talitridae

Explanation of Plate XX

Allorchestes malleolus STEBBING from Muroran.

All the figures were drawn from the male.

- Fig. a. First antenna, $\times 27$.
- Fig. b. Left second antenna, dorsal view, $\times 27$.
- Fig. c. Upper lip, $\times 45$.
- Fig. d. Lower lip, $\times 45$.
- Fig. e. Left mandible, $\times 81$.
- Fig. f. Right mandible, $\times 81$.
- Fig. g. First maxilla, $\times 100$.
- Fig. h. Second maxilla, $\times 100$.
- Fig. i. Maxilliped, $\times 53$.
- Fig. j. First gnathopod in male, $\times 27$.
- Fig. k. Second gnathopod in male, $\times 22$.
- Fig. l. First pereopod, $\times 22$.
- Fig. m. Second pereopod, $\times 22$.
- Fig. n. Third pereopod, $\times 22$.
- Fig. o. Fourth pereopod, $\times 22$.
- Fig. p. Fifth pereopod, $\times 22$.
- Fig. q. First to third pleon segments in side view, $\times 5$.
- Fig. r. Second pleopod, $\times 36$.
- Fig. s. Retinacula of the first pleopod, $\times 314$.
- Fig. t. Hooked setule at the base of inner ramus in the first pleopod, $\times 238$.
- Fig. u. First uropod, $\times 27$.
- Fig. v. Second uropod, $\times 45$.
- Fig. w. Third uropod, $\times 72$.
- Fig. x. Telson, $\times 53$.



M. Iwasa del.

Allorchestes malleolus STEBBING

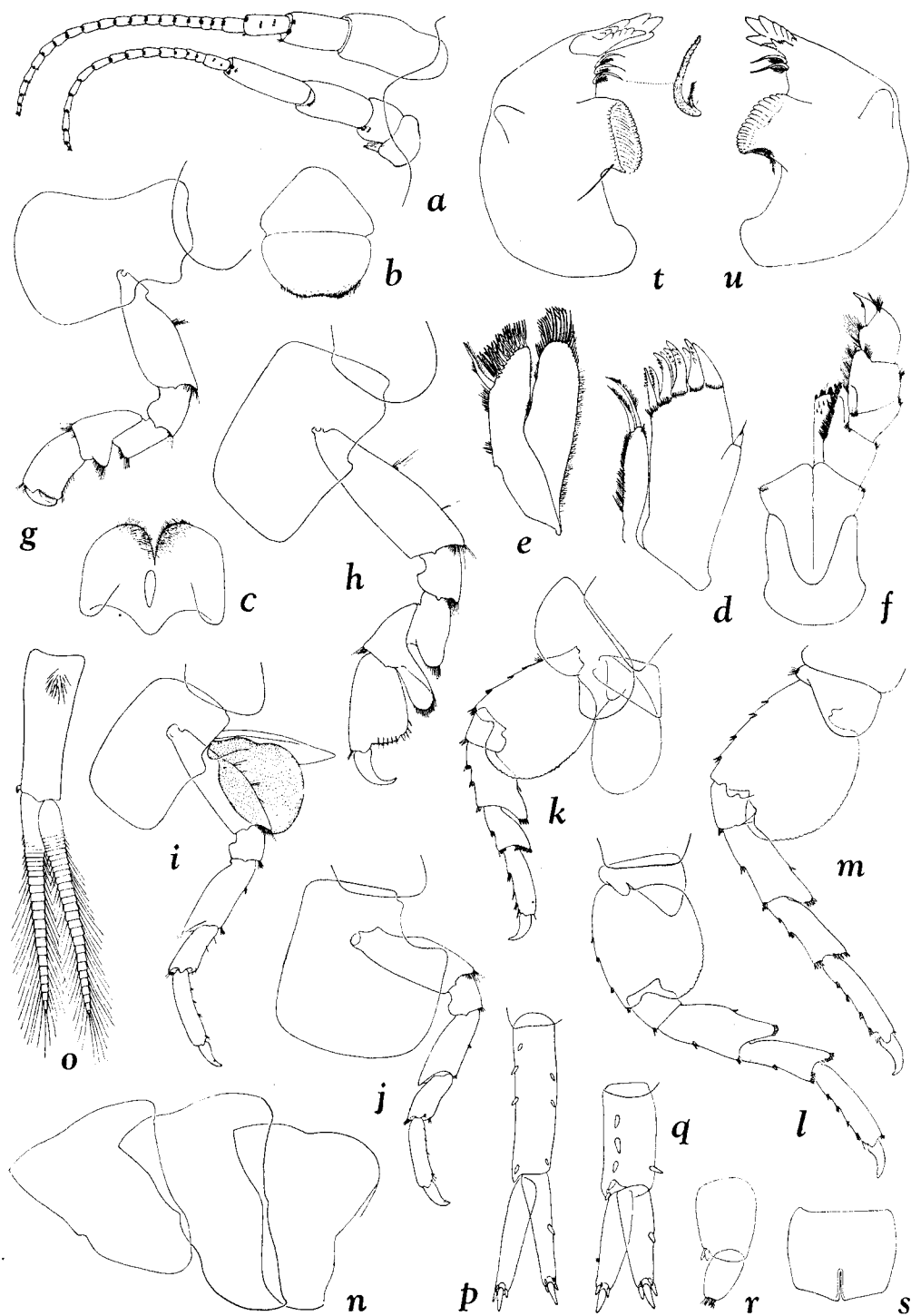
M. Iwasa : Japanese Talitridae

Explanation of Plate XXI

Allorchestes malleolus carinatus, n. subsp. from Paramushir I.

All the figures were drawn from the female.

- Fig. a. First and second antennae in side view, $\times 11$.
- Fig. b. Upper lip, $\times 17$.
- Fig. c. Lower lip, $\times 17$.
- Fig. d. First maxilla, $\times 34$.
- Fig. e. Second maxilla, $\times 34$.
- Fig. f. Maxilliped, $\times 17$.
- Fig. g. First gnathopod in female, $\times 11$.
- Fig. h. Second gnathopod in female, $\times 11$.
- Fig. i. First pereopod, $\times 7$.
- Fig. j. Second pereopod, $\times 7$.
- Fig. k. Third pereopod, $\times 7$.
- Fig. l. Fourth pereopod, $\times 7$.
- Fig. m. Fifth pereopod, $\times 7$.
- Fig. n. First to third pleon segments in side view, $\times 7$.
- Fig. o. First pleopod, $\times 11$.
- Fig. p. Left first uropod, dorsal view, $\times 14$.
- Fig. q. Left second uropod, dorsal view, $\times 17$.
- Fig. r. Left third uropod, dorsal view, $\times 23$.
- Fig. s. Telson, dorsal view, $\times 17$.
- Fig. t. Left mandible, $\times 34$.
- Fig. u. Right mandible, $\times 34$.



M. Iwasa del.

Allorchestes malleolus carinatus, n. subsp.

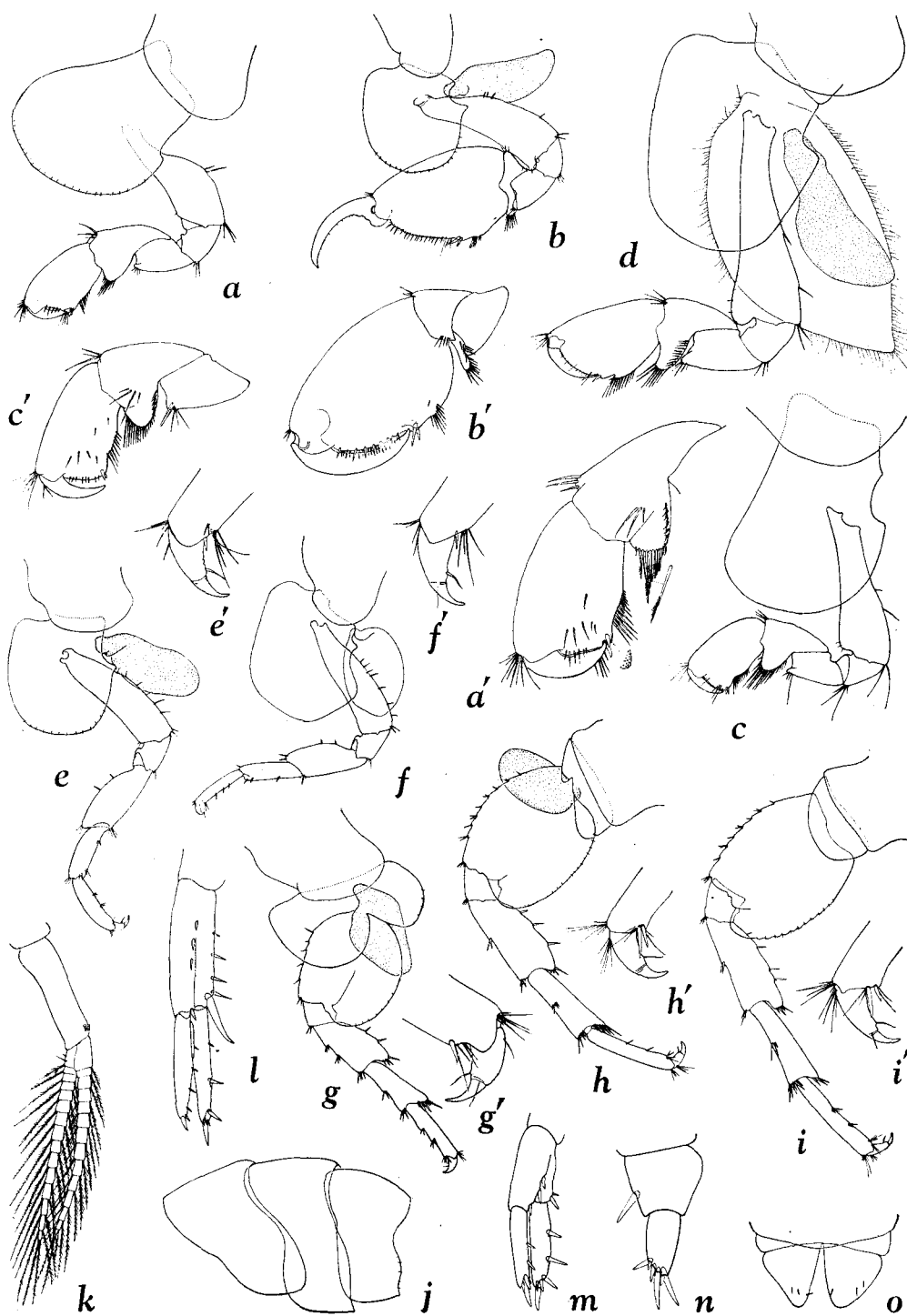
M. Iwasa : Japanese Talitridae

Explanation of Plate XXII

Allorchestes plumicornis (HELLER) from Akkesi

All the figures were drawn from male, except Figs. c, c' and d, which were from female.

- Fig. a. First gnathopod in male, $\times 27$.
- Fig. a'. Inner view of the distal joints of the same, further enlarged, $\times 53$.
- Fig. b. Second gnathopod in male, $\times 18$.
- Fig. b'. Inner view of the distal joints of the same, further enlarged, $\times 27$.
- Fig. c. First gnathopod in female, $\times 36$.
- Fig. c'. Inner view of the distal joints of the same, further enlarged, $\times 53$.
- Fig. d. Second gnathopod in female, $\times 36$.
- Fig. e. First pereopod, $\times 18$.
- Fig. e'. Finger of the same, further enlarged, $\times 72$.
- Fig. f. Second pereopod, $\times 18$.
- Fig. f'. Finger of the same, further enlarged, $\times 72$.
- Fig. g. Third pereopod, $\times 18$.
- Fig. g'. Finger of the same, further enlarged, $\times 72$.
- Fig. h. Fourth pereopod, $\times 18$.
- Fig. h'. Finger of the same, further enlarged, $\times 45$.
- Fig. i. Fifth pereopod, $\times 18$.
- Fig. i'. Finger of the same, further enlarged, $\times 45$.
- Fig. j. First to third pleon segments in side view, $\times 14$.
- Fig. k. Third pleopod, $\times 27$.
- Fig. l. Left first uropod, dorsal view, $\times 27$.
- Fig. m. Left second uropod, dorsal view, $\times 27$.
- Fig. n. Third uropod, $\times 53$.
- Fig. o. Telson, dorsal view, $\times 45$.



M. Iwasa del.

Allorchestes plumicornis (HELLER)

M. Iwasa: Japanese Talitridae